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ABSTRACT

The document presents information on activities designed to foster growth in creativity and upper level thinking of secondary gifted students. An introductory section covers instructional models, including Guilford's Structure-of-Intellect Model and Krathwohl's Affective Taxonomical Model. Activities are described in terms of objectives, procedures, skills being developed, and contributor (name and address) for the following subject areas: language arts (creative writing), social studies, mathematics, science, and activities to integrate (art, personal/social growth activities, and problem solving tasks). (CL)

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THE

CLASS

MENAGERIE

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A Compilation of Exciting Activities
for Secondary School Students

Compiled and Written
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Federal Project #G00-7604827

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EC 112 574

301 Centennial Mall South June, 1978 Lincoln, Nebraska 68509

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FOREWORD

In recent years, several Nebraska schools have experienced an awakening in gifted education. As of the 1977-78 school year, several Nebraska school districts had implemented gifted programs (and the interest is rapidly growing throughout the state).

However, the vast majority of these programs are at the elementary level. While some secondary educators have always been concerned about meeting the needs of gifted and talented students, the Nebraska Department of Education has identified a need for a coordinated effort at the secondary level on behalf of gifted education.

This catalogue has been compiled in order that secondary educators may begin to share classroom ideas which foster growth in creativity and upper level thinking. The activities are meant to be examples of what other teachers have used and considered appropriate for their gifted students.

Hopefully, the ideas presented in this catlogue will serve as catalysts for the creativity of Nebraska educators and inspire them to continue sharing and striving to develop the full potential of our state's gifted and talented students.

Anne Campbell
Commissioner of Education

ACKNOWLEDGMENTS

As a warm thank you to all of the following people:

Pam Goeschel, the lovely person who typed, edited, and illustrated all of the activities, addenda and introductory pages.

Dr. Anne Crabbe, Nebraska Supervisor of the Gifted and Talented, who is the most naturally supportive mentor ever.

Ron Kurtzer, photographer, and Jill Sack, artist, of Nebraska Department of Education Media Services Department.

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Stephen Lahr, Nebraska Art Consultant and Director of the Nebraska Arts Team, for his enthusiasm, generosity and openness.

Don Woodburn, Nebraska Science Consultant, Don Niemann, Mathematics Consultant, Rex Filmer, Language Arts Consultant and Paul Johnson, History and Social Sciences Consultant for their information and advice.

All of the teachers, consultants and publishers who so generously allowed the reprint of their activities and work.

INTRODUCTION

The Class Menagerie is a product of a U. S. Office of Education, Office of Gifted and Talented Grant #G00-76-04827 in progress from August 15, 1977 to August 14, 1978. It will be used as part of Nebraska's In-service Model in order to assist Nebraska secondary educators in the development of gifted and talented programs. The purpose of this catalogue of activities is to provide examples of activities which other educators have felt to be valuable, cognitive, affective or creative learning experiences for gifted and talented secondary school students. The activities are not designed to be pulled and used in their presented form, but rather should be carefully selected and revised according to the levels, interests and abilities of the students with whom they are being used.

Most activities, with the exception of some of those in the science section, conform to the following format:

TITLE

Subject Areas
Materials
Objectives
Description
Activities
Variations
Skills Being Developed
Contributed By

The decision to organize the activities according to subject area was made in deference to prevailing practice in Nebraska secondary schools of organizing curriculum around subject area. However, there are many activities which can and should be used in other subject areas when appropriate. An index at the end of the book is provided for a more complete perusal of activities relating to a particular subject area.

An overview of nationally recognized educational models which can be used with the gifted and talented has also been included for reference. An index of each approach is provided in the index.

We have confined the activities to the subject areas of language arts, social studies, science, math and fine arts, but feel confident that many of the ideas contained within the book could be applied to other areas. In addition, a special section entitled "Activities to Integrate" has been included in order to provide examples of approaches which may be used in all subjects.

The manual is intended to be a potpourri of ideas from various sources and, as such, has its weaknesses and strengths. Joseph Renzulli, in his Enrichment Triad Model, has made a statement which exemplifies the attitude we have taken in our selection of activities:

> "We must keep in mind that giftedness and creativity are in the student's response (not the stimulus materials), and it is what they bring to the learning situation..."
>
> "Activities (for the gifted), if appropriately selected provide for a range of responses, options (i.e., they must be open-ended) so that youngsters with superior potential will have an opportunity to escalate their thinking and feeling processes to whatever levels their own natural abilities allow."

It is sincerely hoped that the contents of this catalogue will inspire secondary teachers to continue to stimulate the abilities of the gifted student.

Melodee Landis
Federal Project Director
Office of Gifted and Talented

MODELS FOR TEACHING
THE GIFTED AND TALENTED

Many of the activities in this book use specific teaching models by well-known authorities in education. The model referred to or the specific skills the activity develops is referred to under the section "Skills being developed" in each activity.

The following pages briefly describe some of these teaching models so that they may be referred to when working with the activities.

The index indicates which activities illustrate the use of which strategies.

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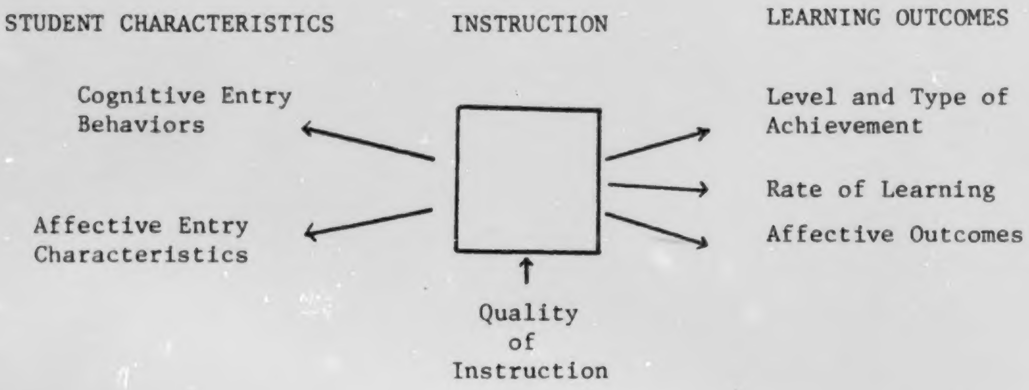
BLOOM'S THEORY OF SCHOOL LEARNING


STUDENT CHARACTERISTICS
INSTRUCTION
LEARNING OUTCOMES
Cognitive Entry Behaviors
Affective Entry Characteristics
Level and Type of Achievement
Rate of Learning
Affective Outcomes
Quality of Instruction

MAJOR VARIABLES IN THE THEORY OF SCHOOL LEARNING

Benjamin S. Bloom's "theory of school learning" is an attempt to determine a small number of variables which will account for much of the variation in school learning. The three interdependent variables which, if properly attended to, should enable schools to approximate an error-free system are:

A. Cognitive Entry Behaviors - The extent to which the student has learned the basic prerequisites to the learning to be accomplished.

B. Affective Entry Characteristics - The extent to which a student is (or can be) motivated to engage in the learning process.

C. Quality of Instruction - The extent to which instruction to be given is appropriate to the learner.

BLOOM'S TAXONOMY

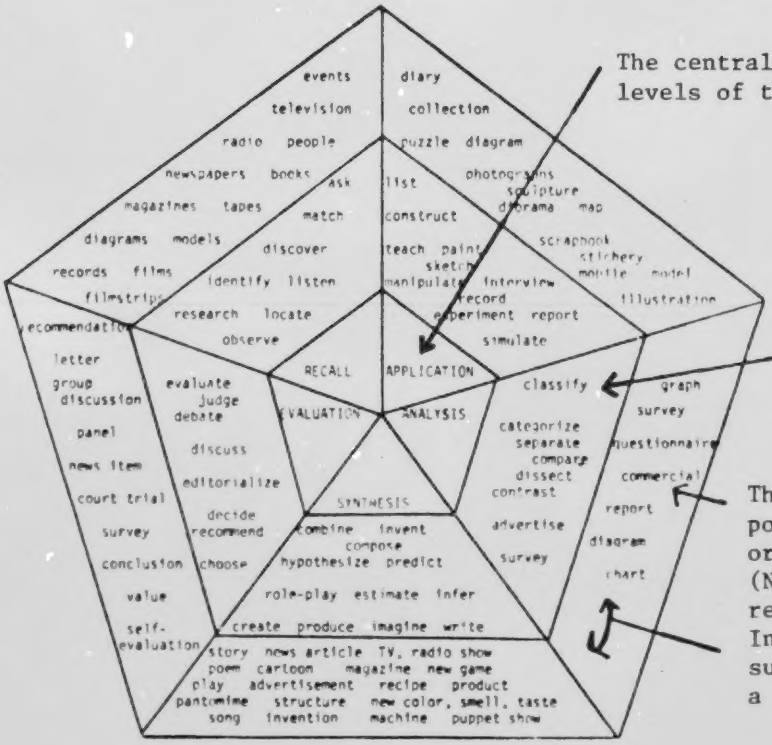
Cognitive Domain

1. Knowledge (Recall of specifics)
2. Comprehension (Lowest level of understanding)
3. Analysis (Taking apart the known)
4. Application (Making use of known)
5. Synthesis (Arranging elements to constitute new patterns)
6. Evaluation (Use of standard of appraisal - internal and external)

Bloom's Thinking Skills*

Memorizing
Observing & Inferring
Collecting Data
Comparing
Classification
Hypothesizing
Coding
Summarizing
Looking for Assumptions
Evaluating

How Are Thinking Skills Developed?


events
television
radio people
newspapers books
magazines tapes
diagrams models
records films
filmstrips
diary
collection
puzzle diagram
photograms
sculpture
diorama map
scrapbook
stichery
mobile model
illustration
ask
match
discover
identify listen
research locate
observe
list
construct
teach paint
sketch
manipulate interview
record
experiment report
simulate
RECALL
APPLICATION
EVALUATION
ANALYSIS
SYNTHESIS
recommendation
letter
group discussion
panel
news item
court trial
survey
conclusion
value
self-evaluation
evaluate
judge
debate
discuss
editorialize
decide
recommend
choose
classify
categorize
separate
compare
dissect
contrast
advertise
survey
graph
survey
questionnaire
commercial
report
diagram
chart
combine invent
compose
hypothesize predict
role-play estimate infer
create produce imagine write
story news article TV, radio show
poem cartoon magazine new game
play advertisement recipe product
pantomime structure new color, smell, taste
song invention machine puppet show

The central hub denotes the different levels of thinking.

For each level, a set of process verbs is suggested to stimulate thought.

The outer section lists possible outcomes if products or projects are required. (Note: Not all activities require a tangible result. In addition, those outcomes suggested may be used for a variety of thinking levels.)

*Contributed By: Cheryl Biles, Pat Farrell, Education Support Services, Irvine Unified School District, Irvine, California.

To facilitate the development of higher-level thinking skill activities, teachers are encouraged to use this web-like diagram as a guide. The mastery of the characteristics of each level of thinking is a great help in formulating better questions. As a teacher develops learning activities, he may use this web to select verbs (process) and nouns (product) in writing questions at various levels of thinking. Each pie shape represents one thinking level - the recall level combining knowledge and comprehension.

Bloom's Affective Domain

1. Receiving (Directing of attention)
2. Responding (Behavior accompanied by feeling of satisfaction)
3. Valuing (Ascribing worth or emotional acceptance)
4. Organization (Ordered relationship of complex of values)
5. Characterization (General reference consistent with total philosophy of beliefs, attitudes, etc.)

KRATHWOHL'S AFFECTIVE TAXONOMICAL MODEL

Some educators feel it is important to devote part of our educational efforts to objectives which deal with attitudes, values, dispositions and motivations of the student. The desired end result would be the students wanting to do something with information, data and knowledge. Here, we are talking about experiences which legitimize feelings and offer empathy for intuition and guessing rather than always expecting the child to know. David Krathwohl has represented this affective domain (1964) in the following taxonomical model:

1. Receiving - Learner becomes sensitized to certain stimuli by developing:

    A. Awareness
    B. The willingness to receive
    C. Controlled or selected attention

2. Responding - Learner is doing something with or about the stimuli in one of the following degrees:

    A. Acquiescence in responding
    B. Willingness to respond
    C. Satisfaction in resonse

3. Valuing - Ascribing worth to a thing, phenomenon or behavior in one of the following ways:

    A. Acceptance of a value
    B. Preference for a value
    C. Commitment

4. Organization - The organization of values into systems, the determination of the interrelationship among them and the establishment of the dominant and pervasive ones on one or both of two levels:

    A. Conceptualization of a value
    B. Organization of a value system

5. Characterization by a value or value complex - At this point internalization of the values is so complete that evocation of behavior no longer arouses affect or emotion except when the individual is threatened or challenged. Indicated by:

    A. Generalized set
    B. Characterization

DAVE'S PSYCHOMOTOR HIERARCHY*

R. H. Dave has produced the following hierarchy for the development of psychomotor skills:

1. Imitation - This is the process of doing exactly as someone else is doing.

2. Manipulation - At this stage the learner experiments and tries various ways of doing the same skill.

3. Precision - Elimination of errors; student is quicker and more efficient in a particular skill.

4. Articulation - The skill has been learned well enough to be consistent and allow the learner to express or communicate a personal concept or try something special and fancy with a skill.

5. Naturalization - The learner has developed a high degree of proficiency and skill and performs without expending much psychic energy or conscious effort.

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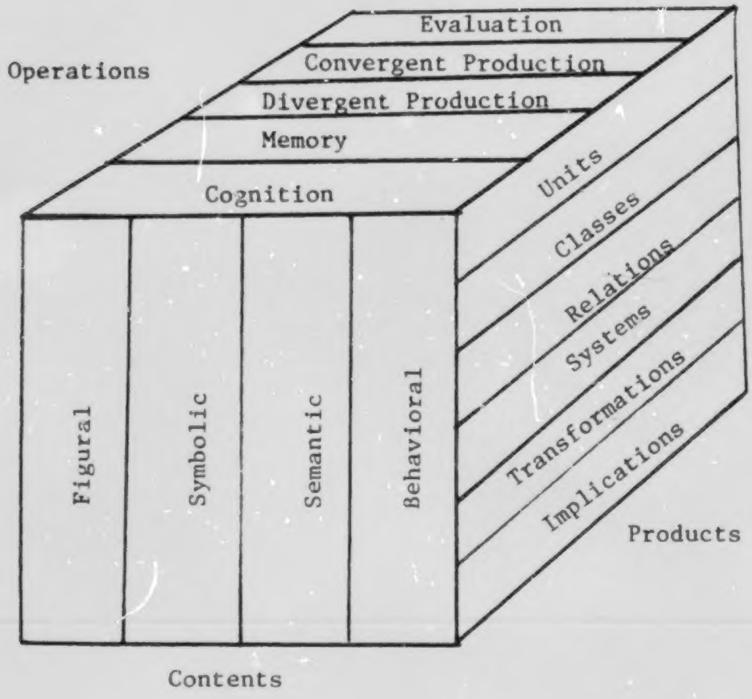
*From Relating Art and Humanities to the Classroom, Saunders, William C. Brown Co., 1977.

GUILFORD'S STRUCTURE-OF-INTELLECT MODEL


Operations
Evaluation
Convergent Production
Divergent Production
Memory
Cognition
Units
Classes
Relations
Systems
Transformations
Implications
Products
Figural
Symbolic
Semantic
Behavioral
Contents

The above figure is J. P. Guilford's Structure-of-Intellect Model, (SI Model) within which each little cube represents a unique combination of one kind of operation, one kind of content, and one kind of product, hence a distinctly different intellectual ability or function.

Although the model illustrates the existence of distinct factors, Guilford felt that these factors fell into three classifications: operations, contents, and products.

The first classification, OPERATIONS, is according to the basic kind of process or operation performed. There are, according to Guilford's model, five major groups of intellectual abilities: factors of cognition, memory, convergent thinking, divergent thinking and evaluation. Since the units included in this section are based mainly on the operations of this model, these are more fully defined below:

Cognition: includes understanding, discovery, rediscovery, awareness and comprehension.

Memory: Retention and recall of knowledge in the form in which it is used.

Convergent thinking: Use information to generate a single, correct or best answer; unique at least to the individual who produced it.

14

Divergent thinking: Imaginative, spontaneous, fluent self-expression.

Evaluation: Regular of all other operations; make judgments based on some criterion or set of criteria.

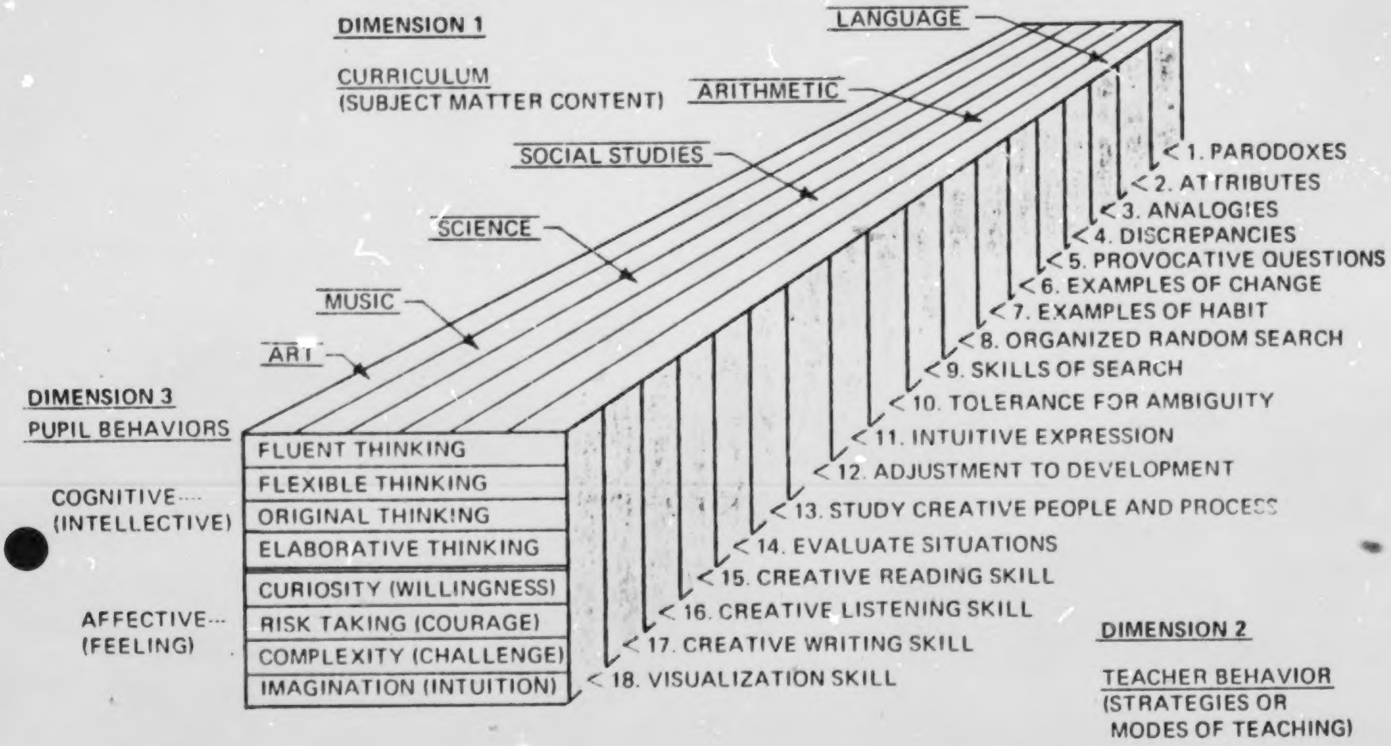
The intellectual factors are further classified by the kind of material or CONTENT involved and these four factors are: figural, symbolic, semantic and behavioral. The third classification of factors results when an operation is applied to a certain kind of content. The six kinds of PRODUCTS resulting are: units, classes, relations, systems, transformations and implications.

Structure of Intellect Institute

Dr. Mary Meeker of the SOI Institute in El Segunda, California, has designed an instructional model around Guilford's model. The program involves testing for the intellectual factors of the model and prescribing curriculum around the strengths and weaknesses of the student.

FRANK WILLIAMS'
MODEL FOR IMPLEMENTING
COGNITIVE-AFFECTIVE BEHAVIORS
IN THE CLASSROOM

D1⇄D2→D3


DIMENSION 1
CURRICULUM
(SUBJECT MATTER CONTENT)
LANGUAGE
ARITHMETIC
SOCIAL STUDIES
SCIENCE
MUSIC
ART
DIMENSION 3
PUPIL BEHAVIORS
COGNITIVE
(INTELLECTIVE)
FLUENT THINKING
FLEXIBLE THINKING
ORIGINAL THINKING
ELABORATIVE THINKING
AFFECTIVE
(FEELING)
CURIOSITY (WILLINGNESS)
RISK TAKING (COURAGE)
COMPLEXITY (CHALLENGE)
IMAGINATION (INTUITION)
1. PARODOXES
2. ATTRIBUTES
3. ANALOGIES
4. DISCREPANCIES
5. PROVOCATIVE QUESTIONS
6. EXAMPLES OF CHANGE
7. EXAMPLES OF HABIT
8. ORGANIZED RANDOM SEARCH
9. SKILLS OF SEARCH
10. TOLERANCE FOR AMBIGUITY
11. INTUITIVE EXPRESSION
12. ADJUSTMENT TO DEVELOPMENT
13. STUDY CREATIVE PEOPLE AND PROCESS
14. EVALUATE SITUATIONS
15. CREATIVE READING SKILL
16. CREATIVE LISTENING SKILL
17. CREATIVE WRITING SKILL
18. VISUALIZATION SKILL
DIMENSION 2
TEACHER BEHAVIOR
(STRATEGIES OR
MODES OF TEACHING)

Attempts to bridge cognitive thinking with affective feeling pupil behaviors have so far been relatively sparse. Williams' Model for Implementing Cognitive-Affective Behaviors in the Classroom attempts to bridge four specific intellectual traits with four attitudinal or temperament traits.

Williams has designed this three-dimensional cube, much the same as Guilford's cubical model, for curriculum planning and classroom teachers.

The structure characterizes an interrelationship between one or more strategies employed by the teacher (Dimension 2), across the various subject-matter areas of the curriculum (Dimension 1) in order to elicit the set of four cognitive and four affective pupil behaviors (Dimension 3). What the teacher does is strategy but how the pupil thinks or feels is process; and both are related to subject matter content.

Pupil Behaviors

Behavior	Meaning
COGNITIVE - INTELLECTIVE*	
FLUENT THINKING To think of the most --	Generation of a quantity Flow of thought Number of relevant responses
FLEXIBLE THINKING To take different approaches --	Variety of kinds of ideas Ability to shift categories Detours in direction of thought
ORIGINAL THINKING To think in novel or unique ways --	Unusual responses Cleaver ideas Production away from the obvious
ELABORATIVE THINKING To add on to --	Embellish upon an idea Embroider upon a simple idea or response Make it more elegant Stretch or expand upon things or ideas
AFFECTIVE - FEELING	
RISK TAKING To have courage to --	Expose oneself to failure or criticisms Take a guess Function under conditions devoid of structure Defend own ideas
COMPLEXITY To be challenged to --	Seek many alternatives See gaps between how things are and how they could be Bring order out of chaos Delve into intricate problems or ideas
CURIOSITY To be willing to --	Be inquisitive and wonder Toy with an idea Be open to puzzling situations Ponder the mystery of things To follow a particular hunch just to see what will happen
IMAGINATION To have the power to --	Visualize and build mental images Dream about things that have never happened Feel intuitively Reach beyond sensual or real boundaries

*These are the four aspects of creative thinking as defined by J. Paul Torrance.

Teacher Behaviors
(Strategies)

No. 1 - Paradoxes	Self-contradictory statement or observation
No. 2 - Attributes	Inherent properties, ascribing qualities
No. 3 - Analogies	Similarities between things
No. 4 - Discrepancies	Gaps of limitations in knowledge
No. 5 - Provocative Questions	Inquiry to bring forth meaning
No. 6 - Examples of Change	Demonstrate the dynamics of things
No. 7 - Examples of Habit	Building sensitivity agains rigidity
No. 8 - Organized Random Search	An example from which new approaches occur at random.
No. 9 - Skills of Search	Search for ways something has been done before (historical search) Search for the current status of something (descriptive search) Set up an experimental situation and search for what happens (experimental research)
No. 10 - Tolerance for Ambiguity	Pose open-ended situations which do not force closure
No. 11 - Intuitive Expression	Skill of expression emotion, senses
No. 12 - Adjustment to Development	Develop from rather than adjust to something
No. 13 - Study Creative People and Process	Analyze traits of creative people, study creative processes
No. 14 - Evaluate Situations	Deciding upon possibilities by their consequences and implications
No. 15 - Creative Reading Skill	Develop a mind-set for using information that is read
No. 16 - Creative Listening Skill	Generating ideas by listening Listen for information allowing one thing to lead to another
No. 17 - Creative Writing Skill	Communicating ideas in writing Generating ideas through writing
No. 18 - Visualization Skill	Express ideas in visual forms Describing experiences through illustrations

TAYLOR'S MULTIPLE TALENTS MODEL

Dr. Calvin Taylor has theorized that nearly all students are talented and can be above average in at least one of the many important intellectual talents we can now measure. The six talents which he feels can be developed in the classroom are:

Creative: The ability to go beyond; putting together seemingly unrelated formation to come up with new solutions or ways of expressing ideas; fluency, flexibility and originality.

Planning: Involves elaboration which considers details concerning operation; sensitivity to problems which need consideration; organization of materials, time and manpower.

Communicating: Involves word fluency, expressional fluency and associational fluency.

Forecasting: Requires conceptual foresight, penetration or minute analyzation of related criteria; social awareness.

Decision-making: Involves experimental evaluation, logical evaluation and judgment.

The students should be seen as thinkers, producers, decision-makers, communicators, innovators, organizers, etc. Using this approach, more students would be above average in intellectual talents and therefore would be happier, more independent and have higher self-esteem.

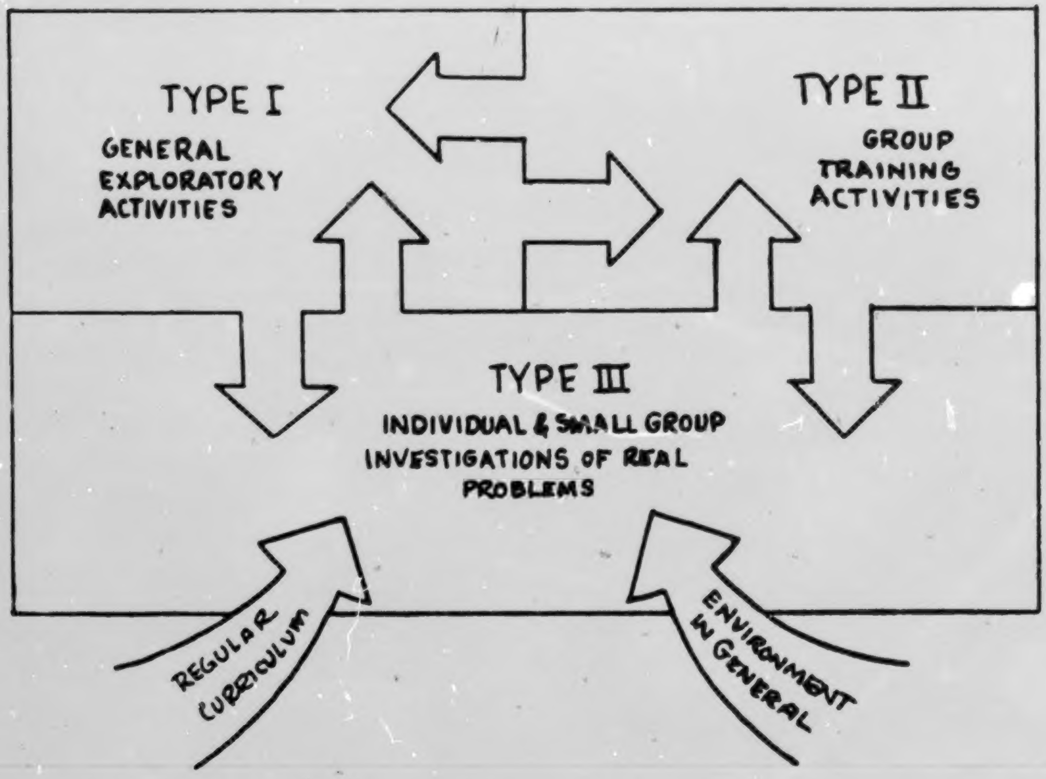
RENZULLI'S ENRICHMENT TRIAD MODEL*

The purpose of Joseph Renzulli's Enrichment Triad Model is to provide a framework into which many existing innovative practices can be placed. It is aimed at providing the opportunity for gifted students to pursue their own interests while focusing on the systematic development of the cognitive and affective processes.

He sees different processes as the paths not the goals of learning. The best model for the education of gifted students should be the "turned-on professional" who is actively engaged in solving problems and adding to his/her body of knowledge.

He also maintains that gifted kids can function well as true inquirers so that teachers should concern themselves with providing the gifted learner with problem-solving situations which are consistent with the student's interests, then aid him in acquiring the skills to solve these problems and finally providing outlets for the student products.

Renzulli's Enrichment Triad Model


TYPE I
GENERAL EXPLORATORY ACTIVITIES
TYPE II
GROUP TRAINING ACTIVITIES
TYPE III
INDIVIDUAL & SMALL GROUP INVESTIGATIONS OF REAL PROBLEMS
REGULAR CURRICULUM
ENVIRONMENT IN GENERAL

---

*Information summarized from The Enrichment Triad Model: A Guide for Developing Defensible Programs for the Gifted and Talented, Joseph S. Renzulli, Creative Learning Press, Wethersfield, Connecticut, 1977.

The Enrichment Triad Model attempts to provide a structure whereby experiences or activities that are above and beyond the so called "regular curriculum" can be provided. These "enrichment" activities may be in their simplest form, merely advanced courses for the gifted but must take into account the student's content interests and learning styles as well as when and where the enrichment opportunities are offered.

The first two types of enrichment activities, General Exploratory Activities and Group Training Activities, are considered to be important for all learners while the Type III Enrichment, entitled Individual and Small Group Investigations of Real Problems, are considered to be the only type that is appropriate mainly for gifted students. It is recommended that approximately one-half of the time that gifted students spend in enrichment activities should be devoted to Type III activities.

TYPE 1 ENRICHMENT: GENERAL EXPLORATORY

Activities

Designed to bring the learner into touch with areas in which he/she may have a sincere interest by:

1. Students pursuing activities purposefully.
2. Exposing students to wide variety of topics from which they might like to select problems for in-depth investigation.
3. Inviting resource persons to make presentations.

TYPE II ENRICHMENT: GROUP TRAINING ACTIVITIES

Activities

Consists of methods, materials and instructional techniques which are concerned with the development of the thinking and feeling process.

TYPE III ENRICHMENT: INDIVIDUAL AND SMALL GROUP INVESTIGATIONS OF REAL PROBLEMS

Consists of activities in which the student is the actual investigator actively engaged in the process of adding new knowledge ideas or products to his/her area of study. The teacher's role here consits of:

1. Identifying and focusing student interests.
2. Finding appropriate outlets for student products.
3. Providing students with methodological assistance and developing a "laboratory environment."

One picture worth a thousand words? You give me 1000 words and I can have the Lord's Prayer, the 23rd Psalm, the Hippocratic Oath, a sonnet by Shakespeare, the Preamble to the Constitution, Lincoln's Gettysburg Address, and enough left over for just about all of the Boy Scout oath — and I wouldn't trade you that for any picture on earth.

author unknown

Language Arts Activities

KNOW THE WORLD

SUBJECT AREA

Language Arts, Social Studies

OBJECTIVES

Students will become more aware of social trends and personal values by contrasting them with the past and future.

DESCRIPTION

A potpourri of explorations in the past, present and future.

ACTIVITIES

Know Your World

1. Explore current social trends through debates, editorial comments, panels, surveys, interviews, news items. Examine issues such as sexual mores, stereotyping, evolution of one race, etc.

2. Examine the social trends of the 60's that have created the environment today: how have these areas been affected-politics/government, military forces, art, music, drama, journalism, education, attitudes of the general public/of students. Take a historical perspective and look at the factors precipitating the student demonstrations, "sexual revolution," civil rights activities, fashion/art/drama changes. How would you have reacted?

3. Project the 80's and 90's: Plan a community of the future, anticipate problems and solutions, where and how will you live?

4. Develop projections about the effects of the future on career goals.

5. Relate the entire past, present, future observation to yourself. What will be your role? How can you prepare for it? What qualities will people need to survive and be satisfied/happy?

Futurism

1. Read a story reflecting the feelings present in another environment. ("The Long Rain"-Asimov is one such story)

2. Write or tape a description of an environment--examine adverbs, adjectives, verbs and nouns that create emotional reactions.

3. Paint the environment you described. Use colors to create an atmosphere. Determine the plant life that could exist there.

4. Generate a being that could inhabit the environment. Tie in materials on dinosaurs, extinction of a species and adaptation.

5. Tactile involvement-blindfolded, feel a variety of textures and generate descriptive terms for the sensations. Work as furiously/fast as possible to rule out any judgement of terms.

6. Create another verbal or written environment using the terms generated.

7. Create a three dimensional, scale model of an environment not on this planet.

8. Make models of being that could exist there.

9. Develop a description of the life style of the creature-kind of cities, government, etc. Share via videotape, scale model, poster, scrapbook, tape, slides, photos, etc.

10. Relate to the present--what modifications has man made to the environment?

11. What has man done to modify the environment?

12. What ways is man evolving to fit possible future environment?

13. Make predictions about our future based on our knowledge of the present, of adaptive behaviors, of current trends.

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation

CONTRIBUTED BY

Carol Hadfield, 1724 North 14th, Beatrice, Nebraska 68310.

READ SPEEDING

SUBJECT AREA

Language Arts

OBJECTIVES

Students will be able to increase reading speed.

DESCRIPTION

One aspect of the Independent Study Program at North Clayton is the students' option of attaining personal growth in their reading skills. A unique and rather full program exists whereby students not only can increase their reading speed, but also can sharpen their comprehension and vocabulary skills.

ACTIVITIES

Each student has a copy of Reading Drills for Speed and Comprehension, Edward B. Fry (Jamestown Publishers). The workbook emphasizes timed readings which are followed by two types of comprehension questions, two types of cloze passages and a vocabulary in context drill. The passages in the drill book are of various difficulties, and the students have the advantage of knowing in advance which ones are more difficult. They keep individual records on graphs in their folders, measuring speed, comprehension and vocabulary skills of each lesson.

Another aspect of the program is the use of the Controlled Reader with the Educational Developmental Laboratories (McGraw-Hill) series of reading filmstrips. The students adjust the speed of the machine themselves and record their progress in their notebooks. They check their comprehension by answering questions in the accompanying manuals.

Vocabulary development is stressed by use of the Vocabulary Development Series (Scott, Foresman). Students listen to tapes of the new words as they are used in context. Once again, manuals are provided that are able to be self-checked; that is, the student can progress at his own rate without having to wait for the teacher to check his work.

In order to give the program even more variety, two phrase flashers (Communacad) are used to help students train their eyes to focus quickly, but accurately, on a phrase or long number.

Further practice is offered in skimming, interpretation, and previewing material.

Regular Independent Study is loosely structured with weekly seminars conducted for and by the students themselves. The leader rotates each week until all have had a turn leading discussion. The topic is announced by the student leader a week in advance, and class members are urged to read magazine articles and other sources so that they will be knowledgeable and maybe even opinionated on the subject. On seminar day the desks are arranged in a circle and the student leader begins with a position statement which ultimately leads to comments and questions by group members. Discussion skills are emphasized, not to mention courtesy. Recent topics include drafting women into the army, nuclear energy, misuse of standardized tests in schools, religions, and the necessity of war.

On the other four class days these students work on their own projects which have recently included everything from advertising units to bionic medicine to biorhythms to bacteria study. Students are assigned faculty advisors in addition to the regular classroom teacher of Independent Study to help guide them in their work. Students are required to meet with their advisor at least once a week to discuss progress, problems, materials, etc.

Students have definite input into what happens in the class. When group interest is shown in any specific subject, speakers who are knowledgeable in that field are invited to address the group. Recent speakers have presented programs on transcendental meditation, group counseling (with simulation by the class) and sportscasting by a local television personality.

Field trips have been limited thus far to the local junior college's library where the students are given a "crash" course in the Library of Congress classification system. They are encouraged to check books out at the college library.

Presentations of individual projects are made in the final week of the quarter to the class. Evaluations are made by the student himself, the classroom teacher, the advisor and the class-at-large by the use of evaluation sheets.

SKILLS BEING DEVELOPED

Analysis, application.

CONTRIBUTED BY

North Clayton Senior High School, College Park, Georgia.

FINDING AND CREATING ART FROM EVERYDAY EXPERIENCE
(Unit designed for 11th-12th grades)

SUBJECT AREA

Language Arts, Art

MATERIALS

Filmstrips:

Man - The Measure of All Things
--"Man Creates: In His Own Image"
--"Man Creates: For God or Country"
--"Man Creates: For Love or Money"

An Inquiry into the Nature of Man: His Inhumanity and His Humanity (Parts 1 and 2)

Art by Talented Teenagers, 1973, 1974, 1975
-- 3 Dimensional Art
-- Drawing and Prints
-- Painting

Central Park - moods and manners of the park contrasted with humans and animals

Clay - animated 3 dimensional forms made of modeling clay

Flowers - Film Haiku

Fog - Show moods

Folk-Dance Today - teenagers' dance party showing ethnic dances which reveal everyday activity.

Pencil Points - manufacturing of pencils from raw materials

Articles to Use in Sensory Groups:

1. Selected records (mood music; sound effects such as Down Memory Lane - record set which includes popular music from the 20's to to the 70's. Classical Records such as The Complete Works of Beethoven. Rock operas such as Jesus Christ Superstar.
2. Candles; ultra-violet light
3. Kaleidescope effect created from colors (this can be accomplished by the use of a few drops of food coloring, water, and olive oil on a flat glass fitted over the display surface of an overhead projector. During projection, the glass can be shaken and/or turned to present the kaleidescope effect).

4. Vinegar, onion, cabbage, gardenia, incense, sardines, etc.

5. Sandpaper, silk, satin, cotton, mud, wire brush, other items of varied texture

Bibliography:

Cary, Joyce, Mister Johnson. New York: Harper and Row, 1969.

Gretjohn, Martin. Beyond Laughter. McGray-Hill. (The role of the unconscious in creativity, wit and humor).

James, Henry. The Ambassadors. New York: New American Library, 1960.

Lowes, John Livingstone. The Road to Xanady. Houghton Miflin. (How conscious and unconscious elements combined to create).

Miller, Henry. To Paint is to Love Again. Grossman. (The release which the author finds accompanying self-expression).

Osborn, Alexander F. Applied Imagination. Scribner. (The act of brainstorming).

Taylor, Calvin W., ed. Creativity: Progress and Potential. McGraw-Hill. (The psychology of creativity).

Woolf, Virginia. To the Lighthouse. New York: Harcourt, Brace and World, Inc.

Useful Resource Films: Why Man Creates
Glass
Cat Has Ten Lives - step by step process of making a sculpture
Concert-Pianist makes literal street music by cavorting on black and white keyboard like the cross-walk outside Royal Albert Hall
Eye of the Beholder - helpful in creating discussion of self-awareness, perception and projection
Blake - courage to live what others have dared to dream

OBJECTIVES

1. The students will read and analyze three chosen modern British novels such as Joyce Cary's Mister Johnson, Henry James' The Ambassadors and Virginia Woolf's To the Lighthouse. (C1,2,4) A1,2,4*)

2. Through guidelines, students will know the characteristics of the fifteen types of novels (examples: gothic, realistic, picaresque, etc.) and will be able to classify the novels included in this study. (C1,2,3) (A1,2,4)

3. The students will identify with character and situation in the novels and produce an example of an experience related to the novel. For example, Mister Johnson invents stories to make the road work in Africa more palatable. The student could create a dance to give action and movement to a job which is sedantary. (C1,2,3,4,5) (A1,2,3,4,5)

4. The students will recognize how others (example: resource person) have created art out of everyday experiences. They will review independently films and related audio-visual aids for inspiration and a motivating force for their own creativity. For example, a student could review a film, (Cat Has Ten Lives shows a process of a creation of art. This film shows step by step how a sculptor makes a bronze statue of a cat from a pencil drawing to the pouring of bronze) and from eaving learned the process, the student now originates an art piece such as a sculpture of a pet. (C1,2,3) (A1,2,3)

5. The students will expand their sensory perceptiveness by participating in small group discussions focusing upon one of the senses. For example, one group focusing on the sense of sight can respond to the affects of candle light and ultra-violet light on objects they view everyday in natural light. Also, in a very dark room students stare without blinking at a brilliantly lit piece of colored paper or a colored slide. Turn off projector after 25 seconds and look into the darkness seeing a different image. The image can be renewed by blinking. (C1,2,3,4,5,6) (A1,2,3,4)

6. The students will write a primary source paper showing judgment of specific chosen instances of creativity in the three novels. One example can be found in Virginia Woolf's To the Lighthouse. The student will judge Mrs. Ramsay's acute sensitivity to her guests at a dinner party. She identified (became one) with one guest in his enjoying the taste of her prepared food. (C1,2,3,4,5,6) (A1,2,3,4,5,6)

7. The students, independently, will reduce to concrete projects those activities in the unit which are experienced abstractly (example: field trips) and the activities in their own lives, thus creating art forms out of everyday experience. For example, the student will produce a painting portraying similarities in line and form in the rows of daffodils at Reynolda Gardens, the rows of cigarettes in an assembly line and the rows of cars in the school parking lot. (C1,2,3,4,5) (A1,2,3,4,5)

8. Each of the students will present his project to the class for evaluation, using criteria of judgment based upon the characters' creative forms in the novels. (C1,2,3,4,5,6) (A1,2,3,4,5)

DESCRIPTION

After reading selected modern British novels, the students will actively participate in role playing, improvisations, structured dramatization and field trips for the purpose of origination, invention, production and utilization, which are the aspects of creativity presented in the novels. During the participation in these activities, the students will be personally involved in the creation of art which reflects their own life experiences. The awareness of the opportunity to create and the development of the ability to create art from everyday experiences are behavioral developments appropriate for the gifted and talented because they encourage flow of thought, variety of kinds of ideas, ability to shift categories and direction of thought, and originate clever ideas which are obvious only in the abstract.

The students will find relevance and importance in this study by learning that people do not perceive life in the same way. They will perceive importance and worth for every type of human activity ranging from the highly enriching (leadership, research, innovation) to the mundane (routine factory worker).

The students have completed a study of modern British poetry and have become aware of the concepts and moods of the people, the times and the writing styles of modern life. The students have led discussions resulting from their explications and critical analyzations of British poetry and have written original poetry, and are thus prepared for the more abstract analyzations required in this study.

ACTIVITIES

Introductory

1. The students will read three modern British novels such as Henry James' The Ambassadors, Virginia Woolf's To the Lighthouse, and Joyce Cary's Mister Johnson. (c1,2,4)

2. The students will identify characterization, trace thematic development, recognize plot structure and distinguish writing style in the novels.** (C1,2,4) **Examples of questions for discussion are:

   Discuss how one character in each of the three novels creates are out of his everyday life situations. Give several examples and explain why those examples were chosen. For instance, in James' The Ambassadors, Strethers (the narrator) perceives a man and woman rowing on a lake in impressionistic terms produced by James' use of vocabulary such as "idyllic," "flowing," "drifted," "intimation," "impression," and "vaguely."

   Discuss how one of your experiences this day can be creatively transformed into an art form. For instance, make a collage showing the sharing of adults and teenagers brought about by working together on one activity (father, son and lawnmower).

   In the novel, Mister Johnson, Johnson receives an unfair pay cut because of a change in managers. He steals money for food from the clerk's office in which he works. The clerk catches him. What should the clerk do? Recognize Mister Johnson's perception of the deed and the clerk's perception of the deed. Discuss your resolution of the event. A contemporary parallelism to this situation is the recent scandal at R. J. Reynolds' Tobacco Company. Executives made inappropriate use of company funds for political influence. What are the differences in the Reynolds' scandal and Johnson's? How would you resolve the Reynolds' scandal?

Developmental

1. The students will assume roles of characters in the novels and, producing their own conversations, converse with one another in the same manner of the characters which they have chosen. (C1,2,3,4,5) (A2,3)

2. The students will participate in improvisations which will reflect situations in the novels and then will voluntarily create situations which are characteristic of the novels. (C1,2,3,4,5) (A3,4,5)

3. The students will discuss the creative aspects of a demonstration by a resource person (examples: artist, musician) who shows the students how he creates art out of everyday life. (C1,2) (A1,2)

4. Students will volunteer for groups that will be divided by types of sensory perception such as one group (sound), one group (light), one group (tough), and one group (smell), and one group (color), and will respond and will clarify their individual perceptions to the materials used in each sensory group. For example, the students in the light group, by using a lighted candle, will recognize the different shades, reflections, and degrees of light. The sound group can distinguish between sounds that are naturally loud and those that express rather normal sounds that suddenly seem very loud or important. What relation do these important or loud sounds have to the establishment of meaning? Do different ethnic groups see different kinds of sounds as large or important. Different students could determine what sounds produce emotional responses and what sounds are important to them and put together a sound portrait. (C1,2,4) (A1,2,4)

5. The students will share field trip experiences at Reynolda Gardens, Tanglewood Lake and Whitaker Park, during which they will respond to the natural environment and the technological environment by abstracting art from these experiences. For example, the students will recognize the graceful lines of the swans at Tanglewood Lake and relate these lines to the shape of the lake. (C1,2,4) (A1,2)

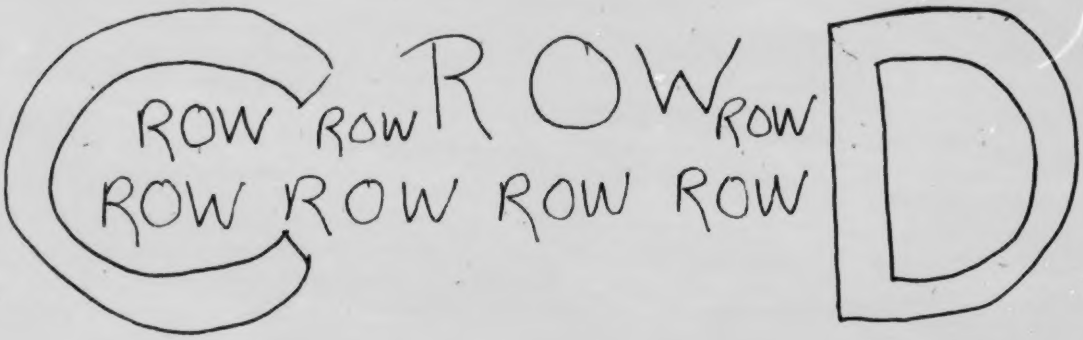
Differentiated

1. The student will originate and produce an interpretive dance expressing an everyday experience. This activity gives the student the opportunity to combine pieces of the usual into a new and unusual whole. For example, the student could produce a dance from movements observed in the school halls.

2. The student will be exposed to material not ordinarily available in school experience such as films, VTR recordings, filmstrips and sound recordings as devices for vicarious experience. The student then can produce his own slide program or filmstrip program or super 8 film program. The student will have the opportunity to use objects (such as an opaque projector to project his own filmstrip program) in a way other than its common use.

Culminating

1. The students will reduce to concrete projects that which they have experienced abstractly. (The projects might be a collection of concrete poems, stories, collages, or other art forms such as films, filmstrips, super 8 films and VTR recordings). For example, a student could produce a film Haiku about jeans and a teenager. See below for an example of a concrete poem. (C1,2,3,4,5,6) (A4,5)



A concrete poem takes a word and makes the word symbolize an experience. Depending upon the creativity of the student, a concrete poem can become complex.

2. The students will write a primary source paper comparing/contrasting chosen characters/themes/situations in each of the novels which focus upon creating art out of everyday life. (A primary source is a source, in this study, a novel, which is itself the subject of the discussion. In comparison, a secondary source is a book being about the book under discussion.

   The student could choose three characters such as Mrs. Ramsay (Woolf's To the Lighthouse), Mister Johnson (Cary's Mister Johnson) and Strether (James' The Ambassadors) and compare Mrs. Ramsay with Johnson and then contrast the two with Strether. The paper will include the student's judgment of the characters' emotional reactions to specific situations, characters' emotional reactions to others and how these emotional reactions translate into art forms in the novels. (C1,2,3,4,5,6) (A1,2,3,4,5,6)

3. Each student will present his concrete project to the class and make a critical explanation of his creation. The students will evaluate the project by judging how well it reflects the explained experience. Criteria of judgment will be based upon the characters' creative forms in the novels. Basic criteria are (1) the ability to recognize the

qualities in the experience which are routine and mundane (2) the ability to recognize in the same experience qualities which transcend the mundane (through the sensuous use of the imagination). Sensuous is a critical term characterizing writing which plays fully upon the various senses of the reader. (C1,2,3,4,5,6) (A1,2,3,4,5,6)

Evaluation

The students will be involved in the evaluation of their own primary source papers and the presentations of their concrete projects (based on the criteria for judgment previously explained) as well as the teacher. These evaluations will judge the students' abilities in creativity, writing, group participation, independent studies and oral participation. Through the evaluative process there will be evidence of the students' growth in awareness and the ability to think abstractly.

SKILLS BEING DEVELOPED

*C1, A1, etc., refers to the nature and level of the objective as described by Bloom and Krathwohl. C1 is an objective in the cognitive domain at the 1st or knowledge level; A1 is an objective in the affective domain at the 1st or awareness level.

Cognitive:
1. Knowledge
2. Comprehension
3. Application
4. Analysis
5. Syntheses
6. Evaluation

Affective:
1. Receiving
2. Responding
3. Valuing
4. Organization
5. Characterization

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MACBETH AND SYNTAX

SUBJECT AREA

Language Arts

OBJECTIVES

Students will be able to make their own generalizations concerning Elizabethan grammar.

DESCRIPTION

Here is an example of how grammatical patterns may be studied in conjunction with Shakespeare.

ACTIVITIES

A. Syntax of Elizabethan questions.
Consider the structure of the following questions. Do some of them sound unnatural according to the pattern of modern language? Mark an X by each that sounds unnatural, and O by those that sound like contemporary questions.

___1. Saw you the weird sisters?
___2. What is it that moves your highness?
___3. Did Heaven look on?
___4. Goes Fleance with you?
___5. Is it far you ride?
___6. Was it not yesterday that we spoke together?
___7. Have you considered of my speeches?
___8. What's to be done?
___9. But who did bid thee join with us?
___10. Is he dispatched?
___11. Which of you have done this?
___12. Do you mark that?
___13. Are you a man?
___14. Why do you make such faces?
___15. Did you send to him, sir?
___16. Sent he to Macduff?
___17. Who's there?
___18. Came they not by you?

Rewrite each question that you marked with an X.

Can you draw any conclusions about how the pattern of some Elizabethan questions differ from modern questions? How does the modern speaker form questions?

Conclusions or generalizations

1.

2.

B. Verb forms - morphology

Consider the underlined verbs in each of the following sentences. Can you draw any conclusions about the use of the st and the th endings? Are they interchangeable? Do they indicate a difference in person? In number? In tense?

1. Thou wouldst be great.
2. Didst thou not hear a noise?
3. Your constancy
   Hath left you unattended.
4. Glamis hath murdered sleep.
5. This murderous shaft that's shot
   Hath not yet lighted.
6. Thou hast it now.
7. My lord is often thus
   And hath been from his youth.
8. If you canst nod, speak too.
9. Thou still hast served.
10. Blood hath been shed ere now, in the olden time.
11. Thou comest to use thy tongue.

Conclusions or generalizations

1.

2.

C. Pronoun forms

Consider the underlined pronouns, thee and thou. Are they interchangeable? Is there a difference in their number: singular or plural? In person: first, second, or third? In case: nominative or objective or possessive?

1. I have begun to plant thee and will labor
   To make thee full of growing.
2. Let me enfold thee
   And hold thee to my heart.
3. Glamis thou art.
4. Thou wouldst be great.
5. Get thee to bed.
6. Yet I see thee still.
7. Art thou but a dagger of the mind?
8. Didst thou not hear a noise?
9. I would applaud thee.
10. Drink gave thee the lie last night.

Conclusions or generalizations

1.

2.

VARIATIONS

Have students translate one of their modern conversations into Elizabethan language. Stage and present in modern setting if desired.

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation.

CONTRIBUTED BY

Mary Commers, Chairperson of English, Lincoln Southeast High School, Lincoln, Nebraska.

POLLUTION

SUBJECT AREA

Language Arts

OBJECTIVES

Students will be able to realize the thematic connection between literary works of Eighteenth Century England and problems of today.

DESCRIPTION

To introduce a unit on eighteenth century satire in English Literature, the teacher can convince students that many twentieth-century problems such as crime and pollution are problems that man has faced for centuries by reading portions of Juvenal's first-century poem on Rome, portions of Samuel Johnson's eighteenth-century poem on London and Jonathan Swift's poem, "Description of a City Shower."

ACTIVITIES

First century A.D. - Juvenal - Rome:

"Traffic"

We're blocked by a surging mass ahead, a pushing wall
Of people behind. A man jabs me, elbowing through, one socks
A chair pole against me, one cracks my skull with a beam, one knocks
A wine cask against my ear. My legs are caked with splashing
Mud, from all sides the weight of enormous feet comes smashing
On mine, and a soldier stamps his hobnails through to my sole...
Tunics, already newly mended, are ripped again. A huge fir log sways
On the wagon hauling it along; and next the drays
Of pine trees, towering, tottering, threaten all in their road
With death. For suppose an axle breaks beneath that load
Of Ligurian marble and lets a whole quarried mountain slide
Down on the crowd; what's left of their bodies? Who can divide
The limbs, the bones, of one from the rest? The pedestrian's crushed
Cadaver vanishes utterly, like his soul.

"Mugging"

The besotted bully, denied his chance in the shabby bars
Of killing somebody, suffers torments, itching to fight,
Like Achilles bemoaning his friend, he tosses about all night,
Now flat on his face, now on his back--there's no way at all
He can rest, for some men can't sleep till after a bloody brawl.
But however rash and hot with youth and flushed with wine,
He avoids the noble whose crimson cloak and long double line
Of guards with brass lamps and torches show they're too much to handle.
But for me, whom the moon escorts, or the feeble light of a candle

Whose wick I husband and trim--he has no respect for me.
Now hear how the pitiful fight begins--if a fight it be,
When he delivers the punches and I am beaten to pulp,
He blocks my way and tells me to stop. I stop, with a gulp---
What else can you do when a madman stronger than you attacks?
"Where you from?" he roars. "Whose dago red and beans have packed
Your bloated belly? What cobbler fed you sheep jowls and chopped leeks?
No answer? Talk, or I'll kick your behind! All right now, speak!
Where's your beat for begging? Tell me from what synagogue you came?
You can try to speak or escape in silence, it's all the same---
He'll beat you up anyhow, then in rage he'll sue for assault.
This is the poor man's freedom: having been soundly mauled
And cut to pieces by fists, he begs and prays, half dead,
To be allowed to go home with a few teeth still in his head.

The teacher can follow the reading of the earlier poems with a reading of the following contemporary poems on the same topic, from Eve Merriam's The Inner City Mother Goose.

Twentieth century - New York City:

from THE INNER CITY MOTHER GOOSE by Eve Merriam

Fee, fi, fo, fum,
I smell the blood of violence to come;
I smell the smoke that hangs in the air
Of buildings burning everywhere;

Even the rats abandon the city:
The situation is being studied by
    a crisis committee.

Now I lay me down to sleep
I pray the double lock will keep;
May no brick through the window break,
And no one rob me till I wake.

Mary, Mary,
Urban Mary,
How does your sidewalk grow?
With chewing gum wads
With cigarette butts
And popsicle sticks
And potato chip bags
And candy wrappers
And beer cans
And broken bottles
And crusts of pizza
And coffee grounds
And burnt-out light bulbs
And a garbage
    strike all in a row.

A writing assignment follows naturally; after a discussion of parody, students are directed to write a parody on the general subject of pollution. Some of the student writing is included here.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application, synthesis, evaluation.

CONTRIBUTED BY

Mary Commers, Chairperson of English, Lincoln Southeast High School, Lincoln, Nebraska.

OLD TESTAMENT

SUBJECT AREA

Language Arts

MATERIALS

Understanding the Old Testament
King James Version of the Bible

Films: The Bible as Literature, Part I
The Bible as Literature, Part II

OBJECTIVES

Students will be able to study the Bible as a piece of literature.

DESCRIPTION

Here is how one teacher approached the psalms and stories of the Old Testament in a unit.

ACTIVITIES

The Psalms:

The word "psalm" is derived from the Greek word "psalmos," which means "a plucking of strings," and indicates that biblical poetry was sung. The Hebrew name for the book, "tehillim," means "praise-songs," and the purpose of many of the 150 poems is to sing praise to God.

The Book of Psalms reflects a wide range of emotions and covers many themes. Though over half of the psalms are ascribed to King David, it is believed that nearly all of them are of a much later date. The psalms were intertwined in the ritual of Israelite life. Some were part of the liturgy for Temple worship; some were sung to celebrate battles or coronations; some were used in family or individual devotions.

Several literary techniques are characteristic of the psalms. Perhaps their outstanding feature is the use of repetition, or parallelism, of thought.

Sometimes almost precisely the same thought recurs in the same or succeeding lines: "I will sing unto the Lord as long as I live: I will sing praise to my God while I have my being." On other occasions, a cause-and-effect harmony is achieved: "I cried unto the Lord with my voice; And he heard me out of his holy hill." Another form of parallelism often used is contrast, or antithesis: "Weeping may endure for a night, but joy cometh in the morning."

Another significant poetic element of the psalms is their striking visual images. These may change swiftly from pictures of everyday life, such as "The righteous shall flourish like the palm tree: He shall grow like a cedar in Lebanon," to soaring descriptions that challenge the imagination, such as speaking of God as one "Who maketh the clouds his chariot: Who walketh upon the wings of the wind." Emotions are likewise visualized and personified. Instead of saying "My sorrow was turned into joy," the psalmist says, "Thou hast turned for my mourning into dancing: thou hast put off my sackcloth, and girded me with gladness."

Read Psalms 8, 23, 104, 137, and 139.

Handout: The Book of Psalms (8, 23, 104, 137, 139)

1. The closest modern equivalent of the Book of Psalms would probably be a:
    a. collection of moral precepts and religious sayings
    b. church hymnal
    c. volume of superior sermons
    d. long-playing record of old ballads
2. To judge from this selection of psalms, a favorite metaphor of the psalmists involved:
    a. wine b. thunder c. water d. harvest
3. Psalm 23: This psalm opens with an attractive metaphor in which the psalmist refers to himself as a:
    a. hungry animal c. happy shepherd
    b. sheep or lamb d. rich owner of flocks
4. Psalm 104: In its first 20 lines, this psalm clearly makes reference to:
    a. the creation of Eden c. Judgment Day
    b. ordinary spring rains d. the Flood
5. Which of the following statements best explains or accounts for the psalm's last four lines?
    a. The psalmist is merely asking for the destruction of his political enemies
    b. The psalmist probably feels that the wicked do not deserve God's blessings and should be punished
    c. Until the ungodly are uprooted, Earth will be an unhappy place
    d. The lines reveal that the psalmist feels guilty for his own sins
6. Psalm 137: This psalm expresses all of the following except:
    a. a desire for vengeance c. fidelity and steadfastness
    b. contrition over sins d. great sorrow
7. The psalm indicates all of the following except:
    a. The Jews were forced into exile in Babylon
    b. The Jews were unhappy in exile
    c. The Jews were forced to worship pagan gods
    d. Their captors wanted the Jews to entertain them
8. Many psalms refer to the "enemy," but the reference is most explicitly made in this psalm. The enemy here is:
    a. traitors b. the Devil c. the Babylonians d. all non-Jews and non-believers
9. Psalm 139: Which of the following is the best summary, or paraphrase, of this psalm?
    a. The psalmist describes his efforts to escape and to hide from God.
    b. The psalmist praises God and examines his relationship with God.
    c. The psalmist asks God to forgive him and to slay his enemies.
    d. The psalmist, in effect, is praising himself.

10. All of the following describe the writer of this psalm except:
    a. zealous, humble, understands himself
    b. faithful, pious, grateful
    c. hates evil, desires vengeance
    d. ruthless, arrogant, sure of salvation

Write the letter of the psalm that is referred to in each question below.

a. Psalm 8	d. Psalm 137
b. Psalm 23	e. Psalm 139
c. Psalm 104	

___11. In which psalm is the speaker most concerned about his own troubles?
___12. Which psalm deals most fully with the relationship between the psalmist and God?
___13. Which psalm most fully expresses the position of man in God's universe?
___14. Which psalm comes closest to being a "nature poem"?
___15. Which psalm is most panoramic in its imagery and subject matter?
___16. Which psalm is a lament about a time of enslavement?
___17. Which psalm expresses confidence that God will comfort and protect the psalmist?

The Short Story: The Book of Ruth:

Although the opening lines of this famous story place it in the time when the judges ruled Israel, perhaps about 1100 B.C., scholars believe it was actually written some seven hundred years later, after the time when the Jewish people had returned to their homeland from a long and bitter captivity in Babylon. The Hebrew prophets of this time, fearful that the Jews would assimilate with the pagans around them, were condemning mixed marriages and advocating the expulsion of all foreign wives. It is possible that the author of the Book of Ruth was moved by the intolerance of the times to write this story, in which he emphasises compassion toward outsiders who accept the faith of Israel.

The land of Moab, Ruth's home, was near Israel. The Moabist religion, however, was a pagan one, probably consisting of idol-worship which was an abomination to Israel. Naomi and her family were devout Hebrews, from the district of Bethlehem and the tribe of Judah.

The representation of ancient Israelite custom in the story of Ruth is authentic and unusually revealing. One of these customs is the so-called levirite marriage (from levir, Latin for "brother-in-law"), according to which a man was duty-bound to marry his brother's widow or the widow of his next of kin if the dead man had had no sons. The first male child born to the childless widow would, for legal purposes, be regarded as the dead husband's son.

In Chapter 1, verse 20, Naomi, which in Hebrew means "pleasant," tells the people of Bethlehem to call her Mara, a Hebrew name meaning "bitter." In Chapter 2, verse 2, Ruth says she will go glean. This means she will gather fallen grain in the fields which, according to Israelite law, were left by the reapers for the poor. Chapter 3, verses 7 through 9: Since Ruth's husband left no brother to marry her, the law required his nearest unmarried relative to wed her. Naomi has advised Ruth to make her claims to Boaz in this unusual and symbolic way. At the beginning of Chapter 4 Boaz goes to the gate. This is where legal agreements were made before witnesses.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application.

CONTRIBUTED BY

Andrea Doerr, Instructor of English, Hastings Senior High School, Hastings, Nebraska.

SUBJECT AREA

Language Arts

OBJECTIVES

Students will be able to:

1. Distinguish fact from gossip.

2. Write their own statements concerning the literature they are studying.

DESCRIPTION

By involving the students as jury members in distinguishing fact from gossip, they are developing thinking skills as well as learning content. Below, a general activity is supplied and suggestions on how to adopt it when reading literature.

ACTIVITIES

Each student writes a statement, from the content of the literature in the assignment, that is a fact or is gossip. If the latter, he adds why it is not true. Then a group of students is selected to be a jury. Each student acts as a witness at a court trial. He can be sworn in to add to the court atmosphere. Then the prosecuting attorney asks for his statement. The jury decides whether it is fact or gossip. The student makes the correction if they are wrong. Change the students on the jury after five witnesses appear. Keep count of the jury decisions. The group with the highest score wins.

1. Nebraska has long been considered one of the most ideal states in which to live.

2. According to the U. S. Census Bureau people have greater longevity in Nebraska than any other state.

3. Yet, for some unexplained reason, 15,000 people in Nebraska died before sixty years of age between June, 1975 and June, 1976; the majority from Omaha.

4. A group of fact finding citizens, headed by Marge Morton, appointed by President Ford, was asked to get to the bottom of the unknown cause of Nebraskan deaths.

5. The TAG director and the committee discovered that the deaths were attributed directly to tension, anxiety, and sheer apathy.

6. During this past year Nebraska as a state has been faced with bankruptcy. Many national reporters have compared its economic crises to that of New York State.

7. Omaha, one of Nebraska's largest cities has recently been given a court order to desegregate its schools.

8. The way in which busing is being implemented in Omaha is similar to that of Boston.

9. The public reaction to the Omaha busing is now at a deplorable crises and can be called another Belfast, Ireland turmoil. People are mentally and physically battling with one another.

10. In spite of the controversies of opinion on busing, some 500 Omaha teachers and particular grades of Omaha elementary children will be transferred to different schools this fall.

11. Nebraska has made great strides in getting its citizens to beautify its state. A Keep Omaha Beautiful group has been instrumental in acting as a steering committee to get citizens to take an active part in beautifying the city, recycling paper and cardboard materials in Omaha and throughout Nebraska.

12. The governor has appointed Mrs. Les Anderson as Chairman for "Keep Nebraska Beautiful."

13. Mrs. Anderson and Senator Edward Chambers, along with Diane Dudley, state gifted consultant, plan to iron out all the state's economic and health problems as well as Omaha's desegregation problems.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation.

CONTRIBUTED BY

Diane Dudley, Nebraska Department of Education, Lincoln, Nebraska.

A SPRING BREAK PLAN FOR REDUCING

SUBJECT AREA

Language Arts

OBJECTIVES

Vary with task.

DESCRIPTION

This is what Barb Bush of Lincoln Southeast offers as optional assignments to a unit on The Pearl.

ACTIVITIES

Exercise Plan #1

The publishers of The Pearl refer to it as a fable. Using animals as characters, write your own fable. Through the animals' actions show a human weakness. Select a human quality, think of a specific incident which illustrates it, and then choose appropriate animals to portray the situation and characteristics. Be sure to write a moral for your fable. This creative experience is guaranteed to keep your mind active. Writing a fable is worth up to 15 points for you.

Exercise Plan #2

Songs of the Family, the Pearl, and of Evil are in Kino's mind. Select one of these three songs and create appropriate lyrics for it. Use a simile in your writing. Enjoy finding just the right word for your lyrics, and be sure to play that flute! This option is also worth up to 15 points.

Exercise Plan #3

Consider writing an essay on the following thesis: In John Steinbeck's The Pearl the use of force strips both those who use it and those against whom it is used of their humanity.

Your essay should include:

an introductory paragraph	general, opening statements thesis statement
body paragraph	topic sentence example(s) and explanation clincher
body paragraph	topic sentence example(s) and explanation clincher

a concluding paragraph	restated thesis general, concluding statements

This essay is worth a possible 35 points. The thinking and writing experience should be valuable for you; it will definitely exercise your mind and trim layers of ugly boredom off your week-end.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation, elaboration, originality, flexibility.

CONTRIBUTED BY

Barb Bush, Lincoln Southeast High School, Lincoln, Nebraska 68506.

BABY BAN

SUBJECT AREA

Language Arts

OBJECTIVES

Students will be able to recognize and carry out the different levels of thinking in Bloom's taxonomy.

DESCRIPTION

You as the teacher can (AND IN FACT SHOULD) apply the six levels of thinking advocated by Bloom, and their several component behaviors, to all the content areas. If you do not integrate these skills for and with the students, the students will not internalize the skills and be able to transfer them in other learning situations in and out of school.

The students must be made to see that these skills are components of thinking. We are learning them (KNOWLEDGE) in a practice situation so they can be used in all other situations (APPLICATION). Otherwise, the knowledge itself will never be applied.

ACTIVITIES

Below is an article which appeared in The New York Post this September. This article can be used as a reading/language arts activity with follow-up questions and/or a discussion. The questions illustrate practice and integration of the six levels of thinking.

BABY BAN GIVES BIRTH TO SUIT

LOS ANGELES (AP)--Steve and Lois Wolfson like their apartment overlooking a yacht harbor at Marina del Rey, and they say they're not about to leave just because they have a baby.

For almost a year, they ignored an eviction notice issued after their landlord established a ban on children.

Now they have asked Judge Harold L. Cherness of Culver City Municipal Court to rule on a suit they brought to keep the $390-a-month apartment. Testimony begins today.

Mrs. Wolfson said nobody objected for more than a year after she brought Adam home from the hospital in September, 1975.

"We've never had any complaints about Adam," Mrs. Wolfson said. "In fact, all of our neighbors have signed affidavits saying they like him and want him to stay in the building, and they're appearing in court on our behalf."

In November, 1976, after the Wolfsons had signed a lease renewal, they got a letter from their landlord, Marina Point Ltd., telling them they would have to leave because of the baby. They chose to fight eviction.

"We love it here. It's a terrific buy," Wolfson said. "There's a great view of the marina from both bedrooms."

Several other children already live in the apartment complex. They lived there before the ban was imposed.

"The children from adjacent buildings who come over to play in front of this one are a lot noisier than Adam's ever been," said a neighbor, Robert Smith.

Discussion:

1. Describe the problem the Wolfson's are now having with their apartment.
   (LEVEL 1: KNOWLEDGE)

2. Summarize why the Wolfson's have refused to leave their apartment.
   (LEVEL 2: COMPREHENSION)

3. Show what the article states people like the Wolfsons can do to avoid being evicted from their apartment.
   (LEVEL 3: APPLICATION)

4. Fill in with two words from the beginning of the article that mean almost the same as the underlined word:
   (LEVEL 4: ANALYSIS)
   "There's a great view of the marina from both bedrooms."

5. Find at least five words in the article that we can associate with being in court.
   (LEVEL 4: ANALYSIS)

6. Differentiate between the meaning of the word "suit" as "a matching outfit or set of clothing."
   (LEVEL 4: ANALYSIS)

7. Predict the possible outcomes of the Wolfson's suit.
   (LEVEL 5: SYNTHESIS)

8. In the Wolfson's case, the landlord is trying to evict them because they have a baby. Substitute other reasons why landlords try to evict tenants.
   (LEVEL 5: SYNTHESIS)

9. If you were the judge in this case, how would you decide or solve the case?
   (LEVEL 6: EVALUATION)

Writing:

Integrating these skills with creative writing is easy. Here are some sample assignments at each level.

LEVEL ONE: KNOWLEDGE

You are the largest tree in Central Park. Describe what you have seen.

Write a descripiton of a person you know.

LEVEL TWO: COMPREHENSION

You are lying on the bank of a stream watching your fishing line. Suddenly you hear a rustle in the leaves behind you. You jump up. Describe in your own words what happens next.

You have just invented a new toy for children. Organize your advertising campaign.

LEVEL THREE: APPLICATION

Construct the type of transportation we might use in the year 2000.

LEVEL FOUR: ANALYSIS

Combine the characters "Fonzie" and Richie of "Happy Days" into one new character. What qualities would this character have and how would he act.

Isolate one of "Fonzie's" qualities or characteristics. Give that quality to Cinderella. How would that change the story?

LEVEL FIVE: SYNTHESIS

You are the pilot of a large transcontinental jet airliner which has just taken off from an airport. Suddenly you notice that one engine is on fire. Predict what happens.

Take the story of Cinderella. Substitute the Prince for Cinderella and Cinderella for the Prince. Tell how the story would be different.

LEVEL SIX: EVALUATION

You have just been told by your doctor that you will be blind in two days. You have only two days to see. Decide how you will spend your last two days of sight.

SKILLS BEING DEVELOPED

All levels, Bloom's Taxonomy.

CONTRIBUTED BY

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PHILOSOPHICAL SOCIETY

SUBJECT AREA

Language Arts

OBJECTIVES

Students will be able to identify themes of books they read and compare with friends.

DESCRIPTION

Ben Franklin started a Philosophical Society in Philadelphia to gather bookish people together to read and discuss great literature. Are there students in your class who would enjoy such an adventure?

ACTIVITIES

1. Pick three or four students and try this.
2. Secretly choose five or six classic books, all of which deal with a single theme or concept. Obtain enough copies of each selection for each member of your society.
3. Have the students read and discuss one book each month, evaluating characters, plot, style, mood, theme, and so on.
4. Then as each new book is read, challenge the group to compare it to the ones read before and try to guess the theme which ties them all together.
5. At the end of the last session reveal the theme. Whether or not students have already discovered it, they will come up with many of their own.

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation

CONTRIBUTED BY

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DICK AND JANE

SUBJECT AREA

Language Arts, Social Studies, Psychology

OBJECTIVES

Too numerous to list!

DESCRIPTION

Here are several ideas which could be used with a unit on societal sex roles. Also available from the contributor is an excellent bibliography.

ACTIVITIES - From Learning Magazine

1. Write a report or make a booklet on "Women in Advertisements" or "Men in Advertisements." Select several advertisements from television, magazines or radio, and use them to show how women or men are viewed by the people who create advertisements.

2. Make a collage of advertisements using these appeals.

3. Analyze the advertising appeals of the ads in at least one popular women's or men's magazine. Include in your analysis only those ads covering one-half page or more, because smaller ads often are straight-forward presentations of information and these ads usually do not include obvious advertising appeals. Tally your findings (how many ads are based on what kinds of appeals) and present them in chart form.

4. Do a comparative analyses of advertising appeals directed toward men or toward women in two different magazines (Sports Illustrated versus Newsweek, for example, or Ms. magazine versus McCall's). Do advertising appeals directed at a given sex differ, depending on the magazine? What do such differences tell you about the audience for whom each magazine is intended? Tally your findings and present them in chart form.

5. In at least one textbook used at your school, analyze content in terms of number of male illustrations versus female illustrations. Tally, too, the adult occupations given for males and females. Note any specific examples of portrayals of boys or girls in nontraditional roles or of content in which either sex is "put down." Make a chart of the results.

6. Analyze the story problems in a math book used at your school. What activities are women and girls, men and boys, engaged in? Draw conclusions and present your findings to the class.

7. Make a bulletin board display of men and women engaged in non-stereotyped activities or of "breakthroughs" for either sex. Use pictures and articles from current newspapers and magazines for this purpose. (Recent examples: an article about the new female state troopers in Indiana; a feature story about a man on a city's women's commission; an article on fathers who have received custody of their children following a divorce; a news item about the first female cadets at West Point.)

8. Give an oral report on women's rights from the suffrage movement to the present. Discuss past and current leaders in this movement, the date of women's right to vote in national elections, tactics used to gain this privilege, arguments used against women's suffrage. Compare the way the suffrage movement began to the way the current women's movement began, and note the connection, in both instances, with civil rights for black Americans. Mention other similarities between the women's movement of the 1800's and the current one. (Example: the formation of liberal and conservative fractions expressing different goals and using different tactics.) List some unattained objectives of the current women's movement; discuss sources of opposition to these objectives.

9. Prepare a written or oral report of the status of women in politics today. Find out, for example, what percent of eligible women voters actually have registered to vote. How many women are elected officials in the U.S. Senate and House of Representatives, state legislative bodies, governorships? How many women have held important judgeships or high office (cabinet posts, for example) in the federal government? Who are the outstanding female politicians today, and what is the outlook for women in politics in the future? (Note: "Women in Politics: An Overview" by Dixie Shipp Evatt is an excellent article that covers these points. It appeared in the spring of 1976 issue of Matrix. Information on reprints can be obtained from Matrix, Women in Communications, Inc., 8305-A Shoal Creek Blvd., Austin, Texas 78758.)

10. Prepare a written or oral report comparing sexism to racism. One source of information is the National Education Association's Fact Sheets on Sex Role Stereotyping. (Note: Write to the National Education Association, Order Department, The Academic Building, West Haven, Connecticut 06516 for information on obtaining these Fact Sheets, which are listed as Stock No. 0585-6-00.) You might also interview black women in the community, asking them about the problems of race and sex discrimination.

11. Prepare a talk about a woman famous in some profession. Emphasize any obstacles (including those related to sex) this woman had to overcome in order to reach her position of leadership or personal success. If she faced no serious obstacles, how do you account for this? Mention her family's attitudes toward her career, along with problems or special strengths she may have had.

12. Interview an influential career woman in your community. Ask questions such as: How did you become interested in your career? How did your family feel about your going into this kind of work? What obstacles did you have to overcome? Do you feel there has been discrimination against you in terms of your salary, advancement, job responsibility? Are you married? If so, does your work affect your family life? Do you recommend that other women follow in your footsteps?

13. Design a flag or banner as a symbol for people's rights in a non-sexist society.

14. Create a mural on sex-role stereotyping of males, females, or both.

15. Write and present a play. Possible themes include a typical day in the life of a modern man or woman, life for men or women 20 or 30 years from now, a historical incident in the suffrage movement.

16. Write poems or short stories on such subjects as how parents train children to "act like" men or women, or ways in which society expects males and females to behave.

17. Survey the career plans of girls and boys in kindergarten (or first grade) and those of students in fourth grade. Is there a difference? Are choices sex-stereotyped?

18. Ask Junior High boys what they want to be when they grow up. Then ask what they would want to be if they were girls. Follow a similar procedure with girls at that grade level. Do career choices change when children "become" members of the opposite sex? Is the range of career choices broader for one sex than the other (either as the interviewee's real or imagined sex)? Is there evidence of sex-role stereotyping in career choices? If so, are boys and girls more stereotyped in thinking about careers for their own sex or for the opposite sex? Analyze your findings and arrive at some conclusions.

19. Survey the favorite school subjects of boys and girls in an early grade and compare these with the favorite school subjects of children in later grades. Is there a difference? Do girls generally prefer language activities to math, social studies, to science (and boys, the reverse) as is popularly supposed? Present findings in chart form.

20. Find ten or more quotes about sex roles. (Bartlett's Familiar Quotations is a good source.) Note both the quote and the speaker's name, and explain the meaning and significance of each quote.

21. Collect adults' cliches (common, stereotyped expressions) about men and women. (Example: Men are logical; women are intuitive.) Lead a discussion on the validity or refutability of each of these expressions.

22. Choose one children's cartoon series on television and watch it at least four times. How are male and female characters portrayed on the show? In one or two words, how would you describe each character as he or she is portrayed (intelligent, stupid, courageous, aggressive, helpless, strong, weak)? Draw some conclusions, using examples to support them.

23. Watch one family situation comedy on television for several weeks. How do the roles of fathers and mothers, sons and daughters, on the show compare with family life as you know it?

24. Write a proposal or outline for a television show or children's book that you think would give children a constructive view of men and women.

25. Choose one comic strip or syndicated cartoon series from the newspaper. Look at ten or more separate cartoons or read the strip for two weeks. Then characterize the males and females shown in the cartoon or comic strip. Using an opaque projector or photocopy machine, provide at least one illustration to accompany the report of your conclusions.

26. Listen to popular music on the radio. How are men and women depicted by writers of song lyrics? Write a report, using examples to support your conclusions.

27. Using a familiar tune, write a new song for people in a nonsexist society.

28. Analyze the depiction of males and females in the library books you have read during the past several months. Is there sex-role stereotyping? If so, is such stereotyping justifiable--for example, in historical fiction, where the author's purpose is to "tell it like it was"; or in traditional literature, which is the written version of folk stories handed down from generation to generation? Is such stereotyping legitimate in modern, realistic fiction? Why or why not? Present your findings and conclusions in an oral report or a written critique.

29. Select a random sample of picture books from a children's library. (Taking every 10th or 20th or 40th book is a good way to do this.) Tally the number of books that have boys or male animals as main characters versus those with girls or female animals. Which sex predominates? Why do you suppose that might be? If you separate your sample into books published before 1970, is there a change toward equal representation of both sexes in the more recent books? If so, why might that be? Analyze your findings and draw conclusions.

30. Look at some teachers' (or librarians') book list that separate books suggested for boys from those suggested for girls. (Two such lists are G. Robert Carlsen's Books and the Teen-Age Reader, 1971, pp. 51-57; and George D. Spache's Good Reading for Poor Readers, 1970, pp. 59-63 and pp. 71-74.) Do you think such sex-differentiated lists

of reading materials are valid? Why or why not? Present your findings and conclusions orally or in writing.

31. Ask girls in a lower grade if they've ever wanted to be boys, and if so, why? Ask boys in the same grade if they've ever wanted to be girls, and if so, why? Then ask the same questions of boys and girls in a higher grade. Which sex seems more satisfied, overall, with its sex-role identity? Does this satisfaction decrease with age for either boys or girls? If so, why might this be? Analyze and present your findings.

32. Visit the toy department of a local store and list toy packages that show girls only, and those that show boys only. Also note those showing children of both sexes. Draw some conclusions from your findings and present them to the class.

33. Invite to your class a guest speaker who represents a nonstereotyped role (a man or woman in an atypical job or an atypical family role). Plan to meet with your guest before the talk to confer with him or her about topics to be covered. Introduce the guest to the class.

34. Use a camera to put together a picture story about a typical day in the life of some person, man or woman, who holds a nontraditional job. Mount your pictures for display; ad captions if you wish.

35. Analyze some aspect of news coverage. Examples: column inches devoted to girls' sports versus boys' sports; ways in which men and women are referred to in headlines; how often a woman's--as compared to a man's--marital status, number of children or physical description is referred to in news stories. Present your findings in chart form, and draw some conclusions.

36. Analyze greeting cards. Compare cards congratulating parents on the births of male infants with those referring to female infants. Or look at birthday cards written for boys and those written for girls. Do differences exist? What kinds? Tally your findings and present them to the class.

37. Ask students from Junior High to write the first three adjectives they think of when you say "masculine." Have them do the same thing for the word "feminine." Tally your findings, present them to the class, and draw some conclusions. At the end of this activity, you might want to try the same thing with your own classmates and the younger students. If so, how do you account for these differences?

38. Visit several classrooms in your school. Examine the wall and bulletin board displays, tallying the number of males and females shown in each. Total your figures. Does stereotyping seem to be practiced? If so, discuss with your teacher and/or several classmates what might be done to remedy the situation.

39. Working with several partners, list all the things that only a father can do for a child. Finally, list all the things that only a parent can do for a child. Compare your lists, and draw some conclusions to present to the class.

40. Analyze the content of a science textbook used at your school. Tally the number of girls shown participating in science activities versus the number of boys. Does one sex tend to be doing while the other sex is watching? Is there a marked difference in the kinds of activities girls are shown doing versus those boys are shown doing? Tally the number of male teachers in illustrations versus female teachers. Look, too, at biographical information about scientists, past and present. How many of these practicing scientists are men? How many are women? Analyze your findings and draw some conclusions.

41. Read Barbarous Rituals in Sisterhood is Powerful. Create a Barbarous Rituals for men.

42. Reverse some stereotypes in advertising, writing and illustrating your own ads.

43. Write and illustrate a non-sexist children's book.

44. Examine past and current issues of Seventeen Magazine. Note unstated assumptions, innuendo, subtle pressure. Note in five ads how body functions are exploited. Choose a recurring theme and exploit it. Choose your own way to demonstrate what you have learned.

45. Do the same thing with Playboy Magazine.

46. Sit in a public place and observe male/female couples. Rank according to attractiveness. Any correllations? Patterns? Did any combination offend you? Why or why not? Organize and present your data effectively.

47. Construct and teach an anatomy lesson using only the facts you can get from babydolls.

48. Do a project of your own choosing. Check your idea with your teacher.

Subject headings to be used for locating materials for "Dick and Jane Dilemma: Femininity and Masculinity"

Abortion
Bio-ethics
Birth Control
Celibacy
Communes
Dating (social customs)
Divorce
Desertion and non-support
Domestic relations
Ethics
Family
Family life education

Free love
Home
Love
Marriage, Mixed
Marriage customs and rites
Manners and customs
Reproduction
Rites and ceremonies
Sex
Sexual behavior
Sexual ethics
Sexual hygiene
Sex instruction
Venereal diseases

Boys
Children
Discrimination in employment
Education of Women
Family
Fathers
Girls
Liberation
Man
Men
Men's Liberation
Mothers
Occupations
Policewomen
Prostitution
Sex discrimination
Single Women
Social Problems
Widows
Woman
Woman-Psychology
Woman-Social Conditions
Woman-Employment
Woman-Biography
Woman-Civil Rights
Woman-Suffrage
Women
Women as artists
Women as authors
Women as physicians
Women as scientists
Women in aeronautics
Women in literature and art
Women in public life
Women in the U.S.
Women's Liberation Movement
Young Men
Young Women
Youth

CONTRIBUTED BY

Lois Hansen, Lincoln East High School, 1000 South 70th Street, Lincoln, Nebraska 68510, from Learning Magazine.

GREEK MYTHOLOGY/THEATER - A MINI STUDY

SUBJECT AREA

Language Arts

OBJECTIVES

Included with each lesson.

DESCRIPTION

Here is a mini-unit dealing with ancient Greek mythology and theater by placing it in a modern setting and presenting a play.

ACTIVITIES

1. Introduction to Greek Mythology.

Teacher will present on the chalkboard a family tree representing the evolution of the various Greek gods with a brief description of each. This will be followed by a group discussion elaborating on the following points:

a. The needs of the Greeks for such elaborate gods.
b. The relationships between their gods and myths.
c. Comparison of Greek religions/myths with others.

Following this activity each student will draw 2 slips of paper that bear the names of a Greek god on each. The students will then prepare, by means of independent research, a biography on each of the gods they selected. All biographies are to be written in the first person. The reports will be presented to the class with the students taking the role of the gods they selected and informing the class of their background. Prior to this culminating activity, the students will be given ample time in the class period to research their gods from the books and materials collected on the subject.

To Encourage: Curiosity and elaboration
Through: Research on Greek gods
Using: Skills of Search, adjustment to development, attributes.

2. Reading of Greek Myths.

Students will select various Greek myths and read them in class. After they have read the myths they are to report to the class concerning the following information:

a. How many characters are involved?
b. The number of different scenes in the myth.
c. Whether or not the supernatural is involved.

The purpose of the above questioning is to have the student start thinking about rewriting a selected Greek myth placing it in a modern setting. After the students report on the myths they reviewed, the class will decide on a suitable tale to be rewritten for possible performance later in the year by the drama class.

To Encourage: Imagination and elaboration
Through: Rewriting of Greek Myths
Using: Attributes, study of creative people and processes

3. Rewriting of Myths

The class is to come to a decision as to which myth they feel would be the most applicable for a modern setting. Once this has been decided, the class will organize into groups and rewrite the Greek myth with the resource teacher supervising their work at each step from the rough draft to the final script. This activity should take three class periods to complete.

To Encourage: Imagination and elaboration
Through: Rewriting of Myths
Using: Attributes, study of creative people and processes, creative writing skill

4. Visualization of Greek Gods

Students are told that they are to visually depict some scene or image pertaining to either a Greek God or myth. They have the options of building a 3-D model of the parthenon, drawing pictures of various gods, or any other creative activity they can invent to enhance a visual image of the subject.

To Encourage: Imagination and elaboration
Through: Visualization of Greek Gods
Using: Visualization skill

5. Value Clarification

Students will engage in a value clarification activity concerning the importance that drama plays in their lives. This will be accomplished by the students ranking their preference on various hypothetical situations according to a teacher prepared personal preference list. After the students have completed their lists the following points will be brought out in a group discussion:

a. Why do you hold these preferences?
b. How have these values been shaped by your parents?
c. Do you think these values will be changed in the future?

At the conclusion of the class the teacher will hand out a copy of the Riddle of the Sphinx. The students will be asked to contemplate this riddle and attempt an answer in the future.

THE RIDDLE OF THE SPHINX

"A thing there is whose voice is one,
whose feet are two and four and three.
So mutable a thing is none
that moves in earth or sky or sea.
When on most feet this thing doth go.
It's strength is weakest and it's pace must slow!"

To Encourage: Fluency and risk-taking
Through: Value clarification
Using: Examples of change, paradoxes, tolerance for ambiguity

6. Theatre Structure

At the beginning of class the teacher will distribute a list of key terms and definitions pertaining to the Greek theatre. The class will then proceed to the outdoor amphitheatre where they will discuss the physical Greek theatre and show how there has been on great change in over 2,500 years.

To Encourage: Flexibility and fluency
Through: Theatre structure
Using: Study of creative people and processes, attributes, examples of change

7. Definitions of Tragedy

Have the class to brainstorm and come up with their own definitions of tragedy and to give examples to substantiate their opinions. This will be followed by a teacher presentation of the Poetics of Aristotle, the Greek definition of tragedy and the six elements by which the quality of all tragedy is determined. Next, the students will listen to a recording of Antigone by Sophocles. During the performance they are to list as many of the six elements of tragedy as possible.

To Encourage: Fluency, complexity and elaboration
Through: Definitions of Tragedy
Using: Attributes, creative listening skill, analogies

8. Examination of Tragedy

The resource teacher will pass out newspapers and new magazines to the class. Each student will analyze a news report for the six elements of tragedy. Each student will then report at the end of class the elements he discovered in the article and elaborate on any missing elements needed to complete the definition of a tragedy.

To Encourage: Flexibility, risk-taking and elaboration
Through: Examination of Tragedies
Using: Creative listening skill, analogies, organized random search,
adjustment to development

9. Examination of Greek Tragedy Playwrights

The students will be asked for the answer to the riddle. (The answer to the riddle is man). This will be followed by a discussion of its meaning and its place in Greek Tragedy. The class will then discuss the evolution of Greek tragedy in the hands of the playwrights, Aeschylus, Sophocles, and Euripedes.

To Encourage: Fluency and risk-taking
Through: Examination of Greek Tragedy Playwrights
Using: Examples of change, paradoxes, tolerance for ambiguity

10. Study of the Physical Theatre

Students will revisit the outdoor theatre behind the elementary school and locate and examine the various physical structures which are direct contributions from the Greeks and note the structures which might be missing if it were a true Greek theatre. A group discussion will be held on the stage of the outdoor theatre with the following question used to spark the discussion: "How could the physical structure of today's theatre be changed or improved upon when so little change has taken place in the past 2,500 years?"

To Encourage: Elaboration, complexity, imagination, and synthesis (Bloom)
Through: Study of the Physical Theatre
Using: Attributes, provocative questions, examples of change

11. Comparison of Playwrights

Have the students pair off and conduct research comparing one of the Greek playwrights (to be assigned randomly by the teacher) with a modern playwright of the 20th century. The modern playwright can be selected by the student from a list of artists collected by the teacher for the research process.

The students will present their research on comparisons between the selected playwrights in the form of a verbal conversation to take place as if the two authors were meeting for the first time. Each student will write his own dialogue and present it to the class in the form of a presentation.

To Encourage: Fluency, curiosity, and imagination
Through: Comparison of Playwrights
Using: Skills of search , creative writing skills, study of creative people and processes

12. Study of Masks, Costumes in Preparation for Performance

Students will study the various masks and costumes used by the Greeks in their productions of tragic plays. Students will be divided into groups of three. Each group will select one scene from any of the Greek tragedies, translate the dialogue from the translated text into modern everyday language and present the scene to the class. The students will also design their own masks and costumes according to the characters they intend to portray. If they feel music will enhance their performance they may also provide music. The performance will be in the outdoor theatre.

To Encourage: Curiosity, originality, imagination, and elaboration
Through: Study of Masks, Costumes in Preparation for Performance
Using: Evaluate situations, discrepancies, study of creative people and processes

13. Performance of Play

The students will perform a scene selected from one of the plays reviewed in the course of this mini-course on Greek Theatre. This student production will act as the culminating activity of this mini-course.

To Encourage: Risk-taking and originality
Through: Performance
Using: Intuitive expression, visualization skill

SKILLS BEING DEVELOPED

Specified by each activity using Frank Williams Thinking/Feeling model.

CONTRIBUTED BY

Project Gateway, Lafayette County Schools, Oxford, Mississippi.

THE GLASS MENAGERIE

SUBJECT AREA

Language Arts

OBJECTIVES

Given the play The Glass Menagerie, the student will read it and describe the importance of the characters and their actions in the play in relation to the playwright's lifestyle.

DESCRIPTION

This activity combines the study of probability with a unit on The glass Menagerie.

ACTIVITIES

1. Read pp. vii-xix in the new classics edition of The Glass Menagerie. Also read Part one (scenes 1-4). Complete the study guide. Do not read beyond scene 4.

2. Since you have studied the playwright and the definition of probability, participate in a discussion of what action you think will take place in Part Two. Keep notes of your group's discussion to compare with what you will read.

SKILLS BEING DEVELOPED

(All curricula at Tech High School in Omaha are written around Bloom's taxonomy.) Synthesis, recall, research, record, predict.

CONTRIBUTED BY

Developed in the Omaha Public Schools for the Technical High Magnet School.

SUBJECT AREA

Language Arts

OBJECTIVES

Students will be able to model the writing of a review after an example of such a review.

DESCRIPTION

For those students who have a writing ability and an interest in theater, develop their writing skill and exercise their evaluative thinking by having them write reviews. Here's how one teacher structured this type of assignment.

ACTIVITIES

Use this review of The Glass Menagerie as a model to review a play that you have seen.

FLEE AS A BIRD
The Glass Menagerie
by Tennessee Williams

This review begins with brief comments on the story of The Glass Menagerie.

The Glass Menagerie is Williams' portrait of the artist as a young man. It is a family play, and as almost everyone learns sooner or later, home means both heart and hurt. In the home of the Wingfields, molded on Williams' own, there is the memory of the absent father, the telephone-company man who "fell in love with long distance." The suffocating mother, Amanda, uses up all the oxygen in any room she enters. The crippled sister, Laura, is as fragile as her tiny glass animals, and the task of the artist-to-be, Tom, is to break out of this enmeshing spider web if he is to salvage his own soul.

Here the reviewer comments very briefly on the history of the play.

Except for Our Town, there is no play better known to Americans than The Glass Menagerie; the audience becomes a casting director and makes rather exacting judgments. Maureen Stapleton is not quite right for Amanda. She is incapable of conveying the proper air of gentility, and she lacks somewhat the valiancy and authority Amanda should possess.

This reviewer gives the greatest

Rip Torn, always an exciting stage presence, is just right for Tom. He never lets the moody dreamer erode the spiky will to escape and achieve. While a trifle too young for the part, Paul Rudd as the "gentleman caller" captures a quality that is very difficult to project from a stage, the kindness of the man.

Doe at Bay. Pamela Payton-Wright's Laura is hauntingly evocative, a vision of a doe at bay. An actress who has done varied parts in the past several years, she is a pointilliste who composes every dot in a role into a harmonic whole. When she releases the driving passion she seems to possess, she may become an actress of immense power. She could be a marvelous St. Joan, a Hedda Gabler or a Lady Macbeth.

amount of space to criticizing the actors' and actresses' characterization of the Wingfields and Jim O'Connor.

This review ends with an overall evaluation of this production.

Thanks to Director Ted Mann and his troupe of accomplished players, this revival finds our greatest living playwright in the best possible hands.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation

CONTRIBUTED BY

Barb Bush, Lincoln Southeast High School, Lincoln, Nebraska.

WILLIAMS' GEMS

SUBJECT AREA

Language Arts

DESCRIPTION

Below are a few ideas for activities from Frank Williams' Classroom Ideas for Encouraging Thinking and Feeling, D.O.K. Publishers (full information below). Each specifies which element of creativity is being developed-first its cognitive component, then its affective component. Teaching strategies are also specified.

ACTIVITIES

To Encourage: Original thinking and complexity
Using: Strategies No. 3 - Analogies
No. 8 - Organized random search
No. 14- Evaluate situations

Crossword puzzles were used effectively to teach spelling and word meaning. Children were divided into groups of three and each group was asked to design its own crossword puzzle using 10 to 12 of the words from the weekly spelling list in some clever or unusual way. Working in groups seemed to generate a great deal of enthusiasm. The groups then exchanged puzzles and solved them by using the appropriate words. This challenged each group to use words in unique ways for the design of their crossword puzzle and to see if they could stump other groups by their originality.

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To Encourage: Original and flexible thinking
Using: Strategies No. 5 - Provocative questions
No. 14- Evaluate situations
No. 17- Creative writing skill

The teacher asked these provocative questions to bring forth inquiry: "Are you aware of all the different explosions that penetrate your life? Did you ever give any thought of exploring your own ability to create explosions?" Some explosions are useful, such as a sneeze or a dynamite blast removing an obstruction. Many explosions provide us with amusement, such as the popping of a balloon or a firecracker. Other explosions are a characterized by mystery and violence and may do great harm, such as the detonation of a nuclear bomb or the explosion of gas in a sewer. There are many kinds of explosions, but all of them are easily identified as explosions. These questions were asked: "Can you list some different kinds of explosions that benefit people? Can you think of and list some different types of explosions that harm people or other living things?" What kinds of explosions might result in these outcomes:? hurt feelings, roofless building, a promotion, great disappointment, prevention of further loss or damage, winning a race, improved communication, expulsion from school?

Now write an unusual story about one of the explosions you have listed. Write about the events that led up to the explosion (causes) and about the happenings that followed the explosion (consequences). Give your story an appropriate and clever title.

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To Encourage: Flexible thinking and imagination
Using: Strategies No. 11 - Intuitive expression
No. 17 - Creative writing skill
No. 18 - Visualization skill

The teacher said, "Let's see what words we can list that express different kinds of feelings or emotions." After the class was able to list more than 55 words, the teacher asked each child to select one of these "emotional feeling" words; and by using any medium compose their own way of expressing it through any of the senses. For example, the word, "sorrow" was selected and some children drew pictures of their feelings about sorrow while others composed a dramatization, a play, a TV commercial, and a vivid story having sorrow as its central theme.

****

To Encourage: Curiosity and risk taking
Using: Strategies No. 16 - Creative listening skill
No. 17 - Creative writing skill

Students in primary grades like to make up stories but are hampered in their creativity because they either dislike the mechanics of handwriting or do not have the ability to write. This lack in skill dampens their creative potential. One upper grade teacher was aware of this hurdle so she asked for volunteers from her class to act as secretary-recorders for the younger students. Some students, who instead of spending a period in study hall or in the library, agreed that they would like to be secretary-recorders in a primary classroom take dictation from the younger children as stories were created and recorded. Both groups had fun reading these stories to their respective classes and the younger students even had more fun catching their secretary-recorders in writing errors. The upper grade students, enjoyed this activity as much as the primary grade students, and would return to their class full of many questions about spelling and sentence structure. They became meticulous recorders and proof readers. Youngsters at the primary level liked the encouragement and fellowship of the older students to share their imaginative stories with.

****

To Encourage: Original thinking and complexity
Using: Strategies No. 3 - Analogies
No. 8 - Organized random search
No. 14- Evaluate situations
No. 17- Creative writing skill

The class was presented the following sentence on the chalkboard:

The verpal blade spittered the lendex borgfully.
(adj.) (verb) (noun) (adv.)

After a discussion of the various word classes or parts of speech represented by these nonsense words, the students were instructed to substitute real, sensible words in their places. They learned to identify parts of speech as they completed the sentence. Then each student made up a nonsense sentence and exchanged it with a classmate. They had fun unscrambling the sentences while learning to identify parts of speech and new vocabulary.

SKILLS BEING DEVELOPED

Below is a list of Frank Williams' teaching model:

PUPIL BEHAVIORS

Cognitive	Affective
Fluent thinking	Curiosity (Willingness)
Flexible thinking	Risk Taking (Courage)
Original thinking	Complexity (Challenge)
Elaborative thinking	Imagination (Intuition)

TEACHER BEHAVIORS

1. Paradoxes
2. Attributes
3. Analogies
4. Discrepancies
5. Provocative Questions
6. Examples of Change
7. Examples of Habit
8. Organized Random Search
9. Skills of Search
10. Tolerance for Ambiguity
11. Intuitive Expression
12. Adjustment to Development
13. Study Creative People & Process
14. Evaluate Situations
15. Creative Reading Skill
16. Creative Listening Skill
17. Creative Writing Skill
18. Visualization Skill

CONTRIBUTED BY

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OPPORKNOCKITY ONLY TUNES ONCE

SUBJECT AREA

Language Arts, Social Studies

OBJECTIVES

The students will be able to develop the ability to produce unusual, remote or clever responses involving re-interpretations or new emphasis on some aspect of an object or situation.

DESCRIPTION

Have students write humorous stories around familiar sayings -- it's lots of fun and develops semantic flexibility.

ACTIVITIES

Students may select any proverb or old saying and using a transposition or play on words attempt to make the proverb clever and humorous.

Be prepared for groaning and complaining because this is difficult to learn to do if the student does not have the skill.

Here are some proverbs which have been changed to make them clever. Can you find a proverb and make it clever, too? Assign this as homework.

Examples:

There was once a piano tuner named Mr. Opporknockity. He ran an ad in the local newspaper. A man saw the ad and called Mr. Opporknockity on the phone. He asked him to tune his piano. The next day, Mr. Opporknockity came to tune the man's piano. After the piano tuner left, the man started to play his piano, but it sounded absolutely terrible. The man was furious, and called to complain to Mr. Opporknockity, but the piano tuner refused to retune the the man's piano. He said, "Didn't you see the ad?------Opporknockity only tunes once.

There once was a Native chief on a Pacific island. He, being chief, was very rich, so rich that he lived in a two story grass shack. His hobby was collecting thrones, for him to sit upon. His giant throne room was on the second story of his grass shack. He slept on the first story. One night, the floor fell through, and all of the heavy thrones fell upon him and killed him. The moral: People who live in grass shacks shouldn't stow thrones.

VARIATIONS

Have students draw cartoon or stick men illustrations and print into small joke books.

SKILLS BEING DEVELOPED

Divergent production of semantic transformations.

CONTRIBUTED BY

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MEEKER SEMANTICS

SUBJECT AREA

Language Arts

MATERIALS

Toothpicks or any object familiar to students such as nails, feathers, plastic caps, straws and popsicle sticks or tongue depressors, tapes and cassettes.

OBJECTIVES

The students will be able to develop the ability to produce many categories of ideas appropriate in meaning to a given idea.

DESCRIPTION

Lots of fun can be had with words, concepts and related words -- here is some (fun, that is).

ACTIVITIES

1. Display article in question.
    - A. List twenty uses of a toothpick (ball or object in question).
    - B. Now place these uses in four categories.
    - C. List twenty uses for thread, etc.
    - D. Place these uses in categories.
2. Encourage students to hand in the above lists in an unusual way.
    - A. A tape recording with running water in the background.
    - B. Words taped on a bottle or sponge, etc.
3. List everything you can think of that fits the term "wet."
4. Be so descriptive that you can almost feel the water coming out of the words.

SKILLS BEING DEVELOPED

Divergent production of semantic classes.

CONTRIBUTED BY

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SUBJECT AREA

Language Arts

OBJECTIVES

Students will be able to develop ability to make generalizations and word associations by supplying a fourth term to fit with three words with 80% accuracy.

DESCRIPTION

Students must come up with another word that fits in category common to three words.

ACTIVITIES

1. Practice, as a class, finding what the following lists of words have in common:

a) cutter	airplane	print	(paper)
b) jail	weird	seed	(bird)
c) water	car	roulette	(wheel)
d) pepper	germs	kleenex	(sneeze)
e) sun	gun	sting	(ray)
f) floor	tale	fib	(story)

2. Hand out the following on a sheet for students to do independently:

stop	petty	sneak	(thief)
elephant	lapse	vivid	(memory)
lick	sprinkle	mines	(salt)
shopping	washer	picture	(window/catalog)
stalk	trainer	king	(lion)
sea	home	stomach	(sick)
walker	main	sweeper	(floor/street)
mouse	sharp	blue	(cheese)
envy	golf	beans	(green)
board	magic	death	(Ouija/black)
athletes	web	rabbit	(foot)
pot	butterflies	pump	(belly/stomach)
bald	screech	emblem	(eagle)
note	dive	chair	(high)
cherry	time	smell	(blossom/bomb)

3. Discuss.

4. Have students make up their own in groups.

5. Devise a room game, modeled after "jeopardy" or "Password" where students can give three clues to partner until students guess the intended word. (Similar to pyramid of "$20,000 Pyramid" TV show.)

SKILLS BEING DEVELOPED

Divergent production of semantic relationships.

CONTRIBUTED BY

Beverly Milam; Area Service Center for Educators of Gifted Children; Region 1, South; Governors State University; Park Forest South, Illinois 60466.

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FIRST AND LAST LETTERS

SUBJECT AREA

Language Arts, Drama

OBJECTIVES

Students will be able to improve in fluency of words which begin and end with the same letters. Students will be able to apply their creativity to writing.

DESCRIPTION

Students will produce as many words as possible which begin and end with the same letters. Then they will use them in creative writing, noting such things as alliteration and sounds of words together.

ACTIVITIES

1. Tell the students that in this exercise they are to write several words that begin and end with specified letters. For example five words that begin with the sound /s/ and end with the sound /k/ are soak, stick, streak, strike, and squeak. Write these five words on the board. Brainstorm more ideas together as a class.

   Example list - beginning with sound /s/, ending with sound /k/

   streak
   slick
   stick
   soak
   sneak
   skulk
   stack
   slack
   sleek
   stake
   smack
   snick
   steak
   strike
   stroke
   sumac
   smock
   sack
   sock
   seek
   sake
   stalk
   snake
   squeak
   squawk
   spoke
   stock
   sick
   silk
   sulk
   slink
   smoke

   Multi-syllable

   summetric
   similac
   sophomoric
   cylindric
   snakelike
   somnific
   cyclic
   silk like
   syllabic
   cystic
   swizzlestick
   sophistic
   cynic
   sonic
   sardonic
   spastic
   sarcastic

   Made Up (Should consist of known word parts)

   steel-like
   cerclic
   sonoric

2. Now have the students practice by writing several words which begin with /s/ and end with /t/. The words may be as long or as short as they like; the number of letters does not matter, just so they begin and end with the correct letters.

3. Now have the students write as many words as they can which begin with /m/ and end with /t/. Allow them about 4 minutes.

4. Have the students exchange papers, and study the answers of the answer sheet they receive. A class discussion should point out how different people can respond differently and how responses can be increased by thinking more flexibly.

5. This exercise could be repeated by having the students write words that begin with /t/ and end with /n/.

6. Have the students choose one or more lists of words and use them in creative writing - poems, stories, descriptions, dialogues. (Show them "The Streak" as an example).

The Streak

The cyclic mystery had struck in the mist,
  in the smoke, in the fog, the somnific smog.
Leaving streaks of silt for the few who resist
  the cynic callousness of the simplistic cog.
A cylindric stroke
A symmetric slit
A snakelike streak
Which was etched in the sand
A conspicuous signal for those who foresee.
  (The pathetic sophist seeking his sardonic end.)
But finding his successor finds misery
  The cystic destruction only he comprehends
But his sulks are silenced by the sonic sounds,
The snickering
The skulking
The stalking
Holocaust.

7. Discuss the sounds of the poems - the alliteration, melody of the sounds.

VARIATIONS

Use vowel sounds for assonance. Give example of comic play using alliteration (Example: "Professor Pippin Pries into the Productions of Paramount Plastics") abandoning final common sounds. Perform the play. (Especially fun dialogue can result)

SKILLS BEING DEVELOPED

Fluency, elaboration, synthesis, divergent thinking of semantic transformations.

CONTRIBUTED BY

Diane Dudley, Melodee Landis, Nebraska Department of Education.
"Creative Opportunities"

SUBJECT AREA

Language arts

OBJECTIVES

Students will be able to develop fluency and flexibility with words.

DESCRIPTION

Students are asked to condense and expand sentences for practice in concise versus descriptive writing.

ACTIVITIES

Instructions to students:

In this exercise you are to rewrite wordy sentences, shortening them as much as you can by replacing groups of words with single words or fewer words, without losing any of the meaning. You may change the words and the order of ideas in the sentences you rewrite. For example:

The wordy sentence, "So far as looks are concerned, no change seemed to have taken place in the house," can be shortened to read, "The house looked the same." Five words, instead of sixteen words have been used to give the same meaning. Your revised sentences should be like this one.

If you wish, you may first make changes in the printed sentence to show your changes like in the following sample:

the same
So far as looks are concerned, no change seemed to have taken place in the house.

The house looked the same.

Now you are to practice on the sentence given below. In the spaces below, write out the revised sentence.

All the time in which the dance was going, everyone had the appearance of being in a state of happiness.

When having to face the fire of the enemy forces, the lieutenant came to a decision to give ground.

From first to last, during the trial, members of the press were much in sight in the courtroom.

1. Tell the students that they are to change a list of short dull sentences to sentences which are more vivid and descriptive. They are to change the subject and object so that they become more specific and to change the verb to one which would be more lively and typical of that subject. They may add any modifiers if they feel they are needed to make the sentence effective.

   EXAMPLE: The dog entered the room.

   The black Cocker-Spaniel bounded into the pink and white daintily furnished bedroom.

   The old St. Bernard lumbered slowly into the busy, clattering kitchen.

2. Have a short class discussion on the example. Ask students to volunteer their sentences about a dog entering the room.

3. Then instruct the students to change the following two sentences as many times as they can to make them more vivid and descriptive. Remind them that each new sentence should be about a particular subject different from all others. Give the students one sentence at a time.

   1. A person is on his way home.
   2. An animal is eating food.

4. Have some of the students read their answers to the class.

5. Discuss with students when to use different styles of writing. (descriptive, stories, poems, explanations.)

6. Assign students to a short paragraph or poem illustrating one of the styles of writing.

VARIATIONS

May precede an assignment for a specific style of writing elaborating on that style with follow-up assignments.

SKILLS BEING DEVELOPED

This exercise covers the factors of expressional, sentence, and ideational fluency together with descriptive writing.

CONTRIBUTED BY

Diane Dudley, Nebraska Department of Education.
"Creative Opportunities"

GROUP CONSENSUS POETRY

SUBJECT AREA

Language Arts, Drama, Art

MATERIALS

Assorted slides.

OBJECTIVES

Students will be able to combine ideas and elaborate upon them while working as a group.

DESCRIPTION

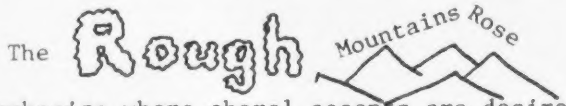
This activity begins as a visual activity then progresses to verbal then back again. Several creative products are created by a group of students.

ACTIVITIES

1. Divide participants into small groups.
2. Each group reacts to slides shown by calling out words through association that derive from the picture.
3. Scribes for each group are selected to record the words they hear from the group according to parts of speech categories on large chart paper.

Nouns	Verbs	Adjectives	Adverbs	Descriptive Phrases

4. Groups assemble these random words into lines of poetry selecting what words they want to include by group consensus.
5. Group illustrates the meaning of its poem by shaping the words and the contours of the lines to enhance the meaning



and to emphasize where choral accents are desired

before THEM now

6. The reader or readers of the group can then read the poem aloud with spirit and drama as the embellishments indicate.
7. To further communicate the poem's meaning sound effects can now be added or choral repetition of parts as background to a solo reading. Experimentation by the group will result in a multitude of devices to make the poem come to life.

8. The group can now begin to discover ways of adding choreography or simple movements to the poem to further enhance its mood.
9. Use props, projected images, improvised costumes, etc.
10. Perform your poem for the other groups and don't forget to share the written poem which is the skeleton or framework or armature of your living group-sculpted poem.

Besides being a device for poetry writing, what other purposes has this activity served?

Does it have a sociological significance?

Does the poem reflect what you personally would like to say?

Write a personalized individual poem now capturing the same experience.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation.

CONTRIBUTED BY

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FAMOUS SAYINGS OR SLOGANS

SUBJECT AREA

Language Arts, Art, Social Studies

OBJECTIVES

Students will be able to recognize, understand and apply different sayings or slogans.

DESCRIPTION

Quotations and slogans can enrich vocabulary as well as increase knowledge of famous people. Use them in your classroom in one of the following ways.

ACTIVITIES

1. Buy or borrow a copy of Bartlett's Familiar Quotations for the classroom. Set aside a space on the chalkboard and ask a student to be in charge of picking a different student each week to write a favorite quotation on the board.
2. After several weeks of quotes from the book, invite students to make up their own and then choose one to go on the board along with the author's name.
3. Or have students write stories ending with puns involving the quotation or slogan of the week. (For example, the common "Rudolph the Red Knows Rain, Dear" joke, or "Jose, Can You See?").
4. For a related art activity, bring to class a poster with a quotation and picture illustrating the saying. Then have kids create their own either by illustrating a familiar quotation or one they have made up. They also may produce humorous posters involving puns.

SKILLS BEING DEVELOPED

Analysis, application, synthesis

CONTRIBUTED BY

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PORTMANTEAUS, WORD ROOTS, DECODERS

SUBJECT AREA

Language Arts

OBJECTIVES

Students will develop verbal flexibility through word activities.

DESCRIPTION

Invite students to experiment with the English language. Here are some of the ways they can play with words and yet still gain meaningful knowledge and skill.

ACTIVITIES

1. Pizza Portmanteaus. Lewis Carroll made portmanteaus famous with his poem, "Jabberwocky." A portmanteau is made by combining two words in both form and meaning. Smoke and fog become smog. Have fun with portmanteaus by having students:

    A) Write several characteristics which describe themselves and combine these into descriptive portmanteaus, and

    B) Identify their favorite pizza ingredients and create portmanteaus for these combination delicacies.

2. Digging for Word Roots. The history of words, etymology, is a fascinating topic. Etymologists are word detectives who uncover layer after layer of change until the roots of modern words can be examined. Spark interest in word origin by featuring a certain word to be researched during spare minutes or between assignments. Your students will be interested to know, for example, that the word woodchuck was the Pilgrims' version of the American Indian word otchock. The Latin word manus, meaning hand, is the source for words manufacture, manifold, emancipate, and even manners (original meaning-how to use your hands).

3. Encoder-Decoder. Encourage gifted and talented students to practice the essential skills of encoding and decoding by learning and using a standard signaling system, such as Morse code, smoke signals, hand signing, or semaphore. With a little research your students will uncover some interesting facts about the uses of these coding systems. For instance, we usually associate semaphore signaling with ships but it is also used on railroads!

VARIATIONS

Adolescents might read, Understanding Media: The Extensions of Man, Marshall McLuhan (McGraw-Hill, 1964) and analyze the basis for McLuhan's word variations.

SKILLS BEING DEVELOPED

Analysis, application, synthesis

CONTRIBUTED BY

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LETTER FLUENCY

SUBJECT AREA

Language arts

OBJECTIVES

Students will be able to improve their ability to come up with word phrases within a given structure.

DESCRIPTION

Here the students will be given a group of letters such as T, A, and L. Each letter stands for the first letter of a word. For example, T A L could mean "Tom Always Laughs." The completed group must be a phrase, sentence, questions, or any other meaningful arrangement of words. In this exercise, they are to write two answers for each set of letters.

ACTIVITIES

Prepare a handout with the following directions and activities on it:

Study the two answers listed below for the first sample item. Notice that for a given letter, a different word has been used in each of the two answers.

T A L

Tom Always Laughs

Talk At Length

Now look at the example below. Write down two meaningful groups of words. Do not write a jumble of unrelated words, use different words in each answer. Now try this one.

S M D

When the signal is given, turn the page. Several items will be given. Try to write two answers to each item. Be sure that each answer is meaningful and fits the requirements. If answers do not come quickly, go on to the next item. Write the answers as fast as you can.

1. N A
2. F C
3. S E N
4. K H I
5. F W T
6. P T O
7. D J B
8. H C G R
9. I L S W
10. A N P I
11. H T P N
12. O B E F P
13. L J C M O
14. L N A C T P

VARIATIONS

This exercise can be used to illustrate and discuss complete sentences, phrases, etc.

SKILLS BEING DEVELOPED

This exercise will encourage the development of fluency and association of ideas.

CONTRIBUTED BY

Diane Dudley, Nebraska Department of Education. "Creative Opportunities"

SUBJECT AREA

Language Arts

OBJECTIVES

Students will be able to create story involving elements suggested by the leader.

DESCRIPTION

Here's a good way to stimulate some exciting stories!

ACTIVITIES

1. Divide class into groups of three or four.
2. Teacher tells whole class that their group has five minutes to come up with story involving some item in the classroom - say a watch. But group one's story will take place in Egypt, group two's in the desert, group three's in the jungle, group four's in the old west, etc.
3. Students share their group's story with class.
4. Individually, the students choose a plot to embellish in written form.

SKILLS BEING DEVELOPED

Divergent production of semantic systems; flexibility; originality.

CONTRIBUTED BY

Lorraine Plum, 1977 ECA conference, Consultant Area Service Center for Gifted & Talented, Elgin, Illinois.

COMPUTER STORIES

SUBJECT AREA

Language Arts, Drama

OBJECTIVES

Students will:

1. Be able to develop concise writing by writing shortened version of common story plots.
2. Develop vocabulary by listening to computer capsules and guessing story.

DESCRIPTION

Leader plays "computer" or "robot" into which are fed computer stories (shortened capsules of familiar films, stories, books, to situations).

ACTIVITIES

1. Leader tells class he/she is going to become computer which must use as few words as possible to communicate common movies, stories or books to the group. Tell them to guess what movie or story the computer is talking about with the following:
    - -A commune is visited by a drug dealer. Man in same profession as father offers first aid to victim of drug. (Snow White)
    - -Woman bribed into producing counterfeit until criminal commits suicide. (Rumpelstiltskin)
    - -Girl slips into coma after caught in natural disaster. Delirious for days; finally revives. (Wizard of Oz)
2. Have students write their own computer stories.

SKILLS BEING DEVELOPED

Divergent production of semantic systems; flexibility.

CONTRIBUTED BY

Lorraine Plum, 1977 ECA Conference, Consultant Area Service Center for Gifted & Talented, Elgin, Illinois.

SUBJECT AREA

Language Arts, Drama, Art

MATERIALS

Glue, scissors, classified ads section of newspaper, construction and composition paper, and a pencil.

DESCRIPTION

Students think up own character from classified ads.

ACTIVITIES

Introductory

Cut out 4 ads from classified ads: 1) a car ad (new or used), 2) a personal (i.e., "I will not be responsible for debts incurred by anyone other than myself. Hugh C. Mann, 1500 Brooks Avenue, Claremont," 3) an ad for a house (rental or sale) or an apartment, 4) an ad for a job.

Developmental

After cutting out these 4 ads, glue them to construction paper, and create a character description. Remember that your character might have these 4 things from the ads or he might be looking for some or all of them.

Culminating

The results of this assignment are generally so good that these created characters can be used in short stories. Also, you can sketch a picture of your character or act it out in play or improvisation.

VARIATIONS

Generally, students do not want to end this assignment with only 4 ads; therefore, I allow them to select as many as they wish, but they must be consistent in selecting the ads. For instance, if your character drives a Rolls Royce and owns a $150,000 home, he most likely would be in a profitable occupation.

SKILLS BEING DEVELOPED

Divergent thinking; Evaluation

CONTRIBUTED BY

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SUBJECT AREA

Language Arts, Social Studies

OBJECTIVES

Students will:

1. Be able to generate ideas for paragraph through brainstorming.
2. Select and organize their ideas into a written paragraph.

DESCRIPTION

The content in these activities is not unusual but strategies for developing divergent thinking are incorporated.

ACTIVITIES

1. Pass out the prepared sheets for this exercise and read the paragraph to the students.

   Below is a paragraph written about an issue on which there is considerable debate. You are to stand either for or against the article, and write a paragraph either defending or attacking it.

   Recent studies have shown that American students are behind students in other countries. In order to catch up with these countries, it was decided to change our educational process. One suggestion was to extend the school year to eleven months instead of nine. This idea was well received, is being seriously considered, and may be started next year.

2. Have them decide whether they are for or against eleven months of school.
3. Have them write down as many reasons as possible for the position they choose, either why they are for or why they are against the change in the school year. (Divergent thinking, 4 minutes)
4. Have a short class discussion in which a large quantity of different reasons is accumulated, and no reasons are evaluated as good or bad.
5. Have them go back over their reasons and check the ones they think are the most important. (Evaluation, 2 minutes)
6. Have them build one or more paragraphs around this set of most important reasons. (10 minutes)
7. Have some students read their paragraphs to the class.
8. Have a class discussion on the steps taken in building the paragraph (Divergent thinking, association of ideas, evaluation, meaningful writing).

This exercise is designed to carry students through the procedures needed to develop and write a paragraph and a theme. Because the exercise covers a variety of abilities, and integrates them, it could be repeated one or more times using different topics for subject matter.

SKILLS BEING DEVELOPED

Synthesis, evaluation

CONTRIBUTED BY

Reprinted from Opportunities for Creativity and Communications, Institutes for Behavioral Research in Creativity, 1417 S. 1100 East, Salt Lake City, Utah 84106.

SUBJECT AREA

Language arts

OBJECTIVES

Students will be able to write message in concise terms.

DESCRIPTION

Given a situation in which the students are reporters, they must write a telegram reporting the situation.

ACTIVITIES

In this task the students are to write a telegram. The situation is as follows:

"You work for the San Francisco Times as a sports reporter. You have just attended the Rose Bowl game in Los Angeles where you saw California win over Michigan in a glorious 27 to 26 upset victory. Sophomore Bert Gaynor was the finest man on California's team, but as he kicked the winning point the opposing team charged him viciously and broke his leg. The drastic turn of events is that the leg was badly broken and will disable him for the next two seasons."

The students' task is to send this entire happening by telegram to the San Francisco Times sports editor. They are allowed 10 words for the standard rate at the telegram office. If they desire, they can make trial answers in the open space before writing the final telegram on the answer lines for words at the bottom.

FINAL TELEGRAM

TO: Sports Editor
San Francisco Times
San Francisco, Calif.

__________ __________ __________ __________

__________ __________ __________ __________

__________ __________

____
Name of Sender

1. Read the telegram and directions to the students.

2. Pair the students.

3. Have the pairs of students complete the exercise. Each pair produces only one aswer sheet. (about 5 minutes)

4. Call upon some pairs of students to read their telegrams and discuss what are some of the key ideas and how they can be expressed.

SKILLS BEING DEVELOPED

Convergent production of semantic systems.

CONTRIBUTED BY

Diane Dudley, Nebraska Department of Education.
"Creative Opportunities"

RESEARCH PAPER

SUBJECT AREA

Language Arts

MATERIALS

Campbell, Wm. Giles, Form and Style in Thesis Writing, Houghton Mifflin, Boston, MA 02107.

Hauser, Travis L. and L. Gray Lee, Writing the Research and Term Paper, Dell (paperback).

Kahn, Gilbert and Donald Julkerne, The Term Paper: Step by Step, Doubleday (paperback).

OBJECTIVES

1. Learning the complete mechanics of doing an entire research paper.
2. Completing research in a career that the student is interested in.
3. Learning the basic guidelines of doing a personal interview and incorporating it into the paper itself.

DESCRIPTION

Junior High School is not too early for a gifted student to learn the complete mechanics of doing a research paper using several sources and coming to some personal conclusions. We use this research unit in our regular classes. The individual differences in the students are reflected in the individual research papers that result.

ACTIVITIES

Introductory:

Discuss the self-discipline necessary in completing a research paper. Discuss the implications of this being an actual first step in the basic techniques of scholarship. Also, discuss the difficulty of locating materials that are fairly current in careers. Explain the concept of change as a necessary ingredient in that the career they choose now may not exist a few years from now.

Sequence:

The instructional period should last at least two weeks. Additional weeks may be allowed for completion of the project (suggested--2-3 weeks).

First Day:

Give a suggested, but not required, sequence in doing the research project (discuss all aspects).

Example: 1) Decide on topic, 2) rough outline, 3) round up all available research sources, 4) take all notes on 3x5 cards in a logical sequence to follow the rough outline, 6) write first draft, 7) revise, 8) organize footnotes and bibliography; and 9) prepare final report.

Second Day:

1. Visit school library to explore vertical files for available information.
2. Discuss limitations of personal choices.
3. Explain the necessity of narrowing title down to a specific topic, e.g., maybe not "Medicine" but "Pediatrics."

Third Day:

Present a suggested outline that could guide pupils having trouble finding a starting point.

Job Analysis Research Paper

A. Nature of the Work
B. Personal Requirements
C. Preparation Required
D. Working Conditions
E. Rewards
F. Future of the Field
G. Conclusions

Fourth Day:

Make appointment to visit the City Public Library to explore additional sources and materials. Maybe arrangements could be made to make the visit for the entire afternoon.

Fifth Day:

Present the scientific method of doing research. Steps include:

A. Identify and state the topic.
B. Make many hypotheses or guesses, using available facts.
C. Collect, organize and analyze the data.
D. Draw some conclusions from your results.
E. Verify, reject or change the guesses on the basis of additional information.
F. Tell others of your results (written research report).

Sixth Day:

Review the scientific method by having each student compare the steps with his own project. Teacher can confer individually with each student about problems he is encountering as the class works on this.

Seventh Day:

With overhead projector show and explain proper method of footnoting. Explain plagiarism clearly and illustrate paraphrasing. Practice paraphrasing with examples.

Eighth Day:

With overhead projector again, explain the correct form of a bibliography.

Ninth Day:

Explain the research interview. Hand out copies of the research interview included with this unit. Read and discuss in class.

Tenth Day:

Have the students bring their papers to class for in-class work. This is the last class day to be spent on this project, although we allow two-three additional weeks for them to finish. You can check progress individually at this time.

Corrective:

Points to emphasize: Students should be careful to:

1. Proofread rough drafts before students make final copies (demonstrate proofreading on the last in-class day).
2. Write in ink on one side of paper or type with double spacing.
3. Make graphs neat and colorful with captions that are easy to understand.

VARIATIONS

Each pupil should share orally with his classmates what he learned from his research project. His methods of research should be explained. Most important are his conclusions.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application, synthesis, evaluation.

CONTRIBUTED BY

Robert A. Sjostrom, Robert C. Erickson, Central Junior High School, St. Louis Park, Minnesota. Reprinted with permission of Minnesota Department of Education from English/Social Studies Explorations, edited by Lorraine Hertz, Gifted Education Coordinator.

CREATIVE WRITING ACTIVITIES

Here are some ideas to use in the classroom to stimulate students to express themselves in writing.

CREATIVE WRITING IDEAS

1. Have students model the following paragraph, letting their minds wander in writing:

   HOW BIG IS A WHALE?

   A whale is very big. A whale is a mammal. An elephant is a mammal also. Elephants are bigger than flamingos. Flamingos are pink. Easter eggs are pink. Ducks lay Easter eggs. Ducks are birds. They have feathers. They can fly like an airplane. People jump out of airplanes with parachutes. They land on a target. People shoot at targets. They also shoot at people. Some people die. They bury them. They also bury treasure. Pirates bury treasure. They also attack ships. The Japanese attacked ships also. Japan is by China. The Chinese make gunpowder. Napoleon used gunpowder in his cannons. Napoleon tried to take over the world. The Germans tried to take over the world also. Hitler led the German armies. Hitler blew himself up in a bomb shelter. Nobel got blown up making dynamite. They use dynamite to blow up mountains. Goats live on mountains. Sheep live on mountains also. Some sheep live with cows. We eat cows. They are in hamburger meet. Hamburgers taste good. So do hot doges and pizza. Pizza was made by the Italians. Italy is by Greece. "Greece" is in engines. Oil is in engines also. They make oil from whales. Whales are what started this discussion.

   Source: Written by David Braun, student in Mrs. Celeste Cater's gifted class at Quintana School in San Luis Costal Unified School District as reprinted by CAG Communicator, Summer Issue, 1977.

2. Cut sentences from magazines. (NEW YORKER, ATLANTIC, HARPER'S are excellent) to write a story. The sentences don't have to make "sense" but should have a flow to them.

3. Read an article about a culture from NATIONAL GEOGRAPHIC. (most schools seem to have a collection of old ones). Write down notes on food, clothing, housing styles. Find out where the people live and what customs they consider valuable and important. Write a poem or short story from the point of view of the person.

4. Have several people write a story together. One person writes one sentence, then without discussing it, the second person adds a sentence. Each person takes a turn until they reach a point where an ending seems appropriate. This is a good "get-acquainted" activity. Butcher paper and marking pens are a good way to do this.

5. Give students a pile of newspaper. Have them choose two articles and tell how they are related. Add another article and show the relationship among the three. This works best as a small group activity. An example two students found recently between an article on the brain and one on installing copper tubing was that

both required understanding of a system. I usually preface this activity with a discussion of some famous inventors, attorneys and public servants who didn't really find new information; they merely put information together in a different way.

6. When assigning a research paper, I require three subjects to be chosen so part of the task is to show the relationship among the three. For example, Japan - a) agriculture, b) food, c) exports. This requires some guidance so that three subjects aren't selected that are too difficult to relate to each other.

   Source for Ideas 2-6: Mary Byington, Irving Junior High School, Lincoln, Nebraska.

7. Give students an example of a story using the wrong homonyms in it (e.g., "A Harry Tail") Have them write their own; wonderful double meanings and puns can result.

   Source: Jan Moore, Irving Junior High School, Lincoln, Nebraska.

8. The ultimate assignment is to write either a description of a place or a description of a person including the ideas below:

   Person Description

   Personality Trait(s)
   Facial Features
   Physique, body features, and actions
   Clothing
   Identity, background, and life history
   At least one of the following:
     other's reactions to the person
     the person's thoughts and feelings
     the person's speech or conversations

   Place Description

   Mood(s) or feeling(s)
   Spacial arrangement
   Appearance and feel of objects
   The identity, locale, historic period, time, and weather conditions
   At least two of the following:
     description of movements within the place
     description of sounds within the place
     description of smells within the place
     description of tastes within the place

9. Creative Writing Topics for Lord of the Flies:

   A. Write a story about the boys' return to England. Tell about the boys' reactions, reactions of their families, and reactions of others back home.
   B. Write a story of the missing boy with the birthmark. Tell where he went and what happened to him.
   C. Write a story about Jack and Ralph meeting again when they are in college. Tell what their reactions to each other are and how they have adjusted to their return home.

D. Write a story about the family life that any one of the boys had in England (for example Piggy's life with his Auntie or Ralph's relationship with his father or Jack's family life).
E. Write a story of how and why the boys left England.
F. Write a story about the crash on island and the storm that follows.
G. Write a story about the parachutist whose plane is attacked over the island.
H. Write a story about the naval officer who rescues the boys. Tell about the events that lead up to the rescue and his reactions to the situation.

10. Comic Strips:

Make two original comic strips for your project.
A. Select one of the seven major themes or categories for your comic strip.
B. Select a general topic or situation for the strip.
C. Select the type of comedy you will use for your comic strip.
D. Select the comic technique you will use.
E. Develop the topic idea through incidents, dialogue or monologue, characters, point of view.
F. Illustrate the comic strip with at least three or four panels.

Source: Olinda Boslau, Lincoln Southeast High School, Lincoln, Nebraska. For Ideas 8-10.

11. Crossword Puzzles: Students can make their own crossword puzzles on a specific topic. Questions could be based on famous literary characters or a book they have read. It could also be basedon a given vocabulary area such as words we've borrowed from other languages or manias. Let the students make their own ditto masters so the puzzles may be run off for other students to try.

Source: Linda Scranton, Norfolk Junior High School, Norfolk, Nebraska.

12. Read the first part of each statement aloud. Wait while students guess the second part (in parentheses). Let groups brainstorm their own examples. Have them write and illustrate their examples.

I could have been a nin (but I had too many bad habits).
I could have been a trailor (but I just didn't seam right for the job).
I could have been a piece of elastic (but that would be stretching it).
I could have been a light (but I wasn't bright enough).
I could have been Tarzan (but I couldn't swing it).

Source: SOI Abilities Workbook, Mary Meeker (Divergent Production of Semantic Transformations).

13. Have students select a theme to develop with poetry and/or music. Working individually or in groups, the students will prepare a a written script including an introduction, a body and a conclusion. The script will include songs and/or poetry examples and then explain the poems or songs and relate them to the theme. Students may also write original songs and/or poems to include in their presentations.

Have students present or perform their finished products.

Source: Olinda Boslau, Lincoln Southeast High School, Lincoln, Nebraska.

14. Writing to Music: Put on a recording (one without words works best) and try to write like the music makes you feel (Ravel, Tchaikovsky, Beethoven, Wagner or jazz, blue-grass). Or have a guitarist play behind the poets as they work.

15. Love: The theme of the day is "love." Students bring inexpensive tokens of love to the class--straw or paper flowers, ribbons, heart-shaped candy--and give them to their classmates. Love poems are read aloud and discussed as is the story and social significance of valentine's day and the symbol of the heart in denoting affection. Sentimental or romantic music (classical and popular) is played and love ballads and songs and the part love plays in modern drama, movies and the contemporary novel. Photos and slides of the world's greates lovers are shown or decorate the room. The emphasis is on love and how important it is to life.

16. Myself, Inside and Out: This is especially good for turning poets into themselves. Begin each line of your poem with "I am the one who..." Or if the poets are very young, begin each line with their own name.

    A. Write a poem to some part of your body.
    B. Write a poem about the inside of your soul. Since none of us knows what that might be like, this might be description, an account of its contents, the sounds or colors there.
    C. Write a prayer. This need not be to God. It might be an open prayer to their father or mother, or to a friend or to a tree. This is not aimed at religion but at getting something private and wonderful into words.
    D. If you could save only one thing from your burning house, what would it be?
    E. Others:

        1. My favorite word
        2. My epitaph
        3. The best day of the week
        4. The worst day of the week
        5. The best (anything) there is
        6. The worst (anything there is

17. Trivia: The students are asked to make a list of factual but trivial things of which they may be aware or can research out of source materials. The idea is to stimulate thought and discussion on trivia...what is it?...what does it mean? Trivia emerges as almost visual-graphic facts, many of which can be illustrated. Compile trivia lists on bulletin boards.

    Examples: A porcupine is equipped with about 18,100 quills. The average American housewife washes 340 tons of dishes in a lifetime. About 57,300,000 Americans dine out each week.

18. Nursery Rhyme Analysis: Select a rhyme or several lines of a poem. Read them aloud. Rewrite them. For example:

Mary had a little lamb
Whose fleece was white as snow.
And everywhere that Mary went
The lamb was sure to go.

or

Mary owned a small lamb
With snowy fleece
Which followed her
Wherever she went.

Do the two versions mean the same thing? Are they the same thing? Why? What is the effect of altering the rhythm?

19. Collaborative Poems: With a group of your friends, write a collaborative poem. There are any number of topics from which to choose or consider one of the following:

A. The Fictional Us -- each person writes an untrue line about himself/herself.
B. A Celebration of Us -- each person writes a line that "toasts" the group.
C. Z Street School -- each person writes a line characterizing the school.
D. Y Street -- each person writes a line fantasizing or describing the neighborhood in which he/she lives.

As a group listen to the lines as they are read. Decide on the order in which they should appear. Decide on any word changes, rhythmic pattern, rhyming patterns that should be established. You may want to develop a super-concrete poem that would hang in your classroom or school hall, or to develop a multi-media program.

20. Poem for 14 Words: I call this 'Poem for 14 Words,' but fewer words may be used. Have the group supply at random words they find interesting or would like to use in a poem. Put all the words on a black board. Then ask everyone to make a poem using up all the words. (They may change the tenses or endings of words.) Try not to use any additional words except connectives like the, and, or, while.

21. Graffiti: Write down as many impressions as you can -- objects, people, place names, events, names and make them specific. You may want to do this for:

one day, one year (1968 etc.), one place (the James River), or one town (Cavour, Milltown).

Then when you have your collection of stuff, make it into a poem.

Have the group agree on a subject or place. Now put all their impressions concerning that subject on a black board. Have them be very specific. Now have each poet do a poem of his own from this collection of stuff.

22. Encyclopedia Poems: Pick a topic or person. Look it up in the most available resource book. Write down interesting facts about it. Now use those facts to write a poem.

23. Old and Young Writing: Pre-school and kindergarten, even primary students can't write as much as they can say. So if you bring them a group of older students to serve as "secretaries" they will hurdle that problem. Give each child his own secretary and let him tell his poem. The secretary only writes down what he hears. This system tends to keep order in the group, making the younger ones serious and the older ones set an example.

The reading that can follow such a session will be fun, too, with each child volunteering his secretary to read for him.

This teaches older students how to write simply again, also.

Elderly persons with arthritic limbs or other inhibiting conditions will also benefit from the "secretary" system. Besides being a shot in the arm for some elderly people, the stories and characters the young secretaries learn may be invaluable to them.

24. Found Poems: Great for perennial browsers or people with writing difficulties or without motivation. Together or on your own, go through old magazines or newspapers in search of interesting slogans, lines, phrases and cut them out. Then piece them together on a backing sheet, glue them on, and you have colorful poems complete with interesting graphic effects. Such "found" lines work just as well for experienced poets borrowing them into their latest work, as for inexperienced ones.

25. Find in the dictionary five words you don't normally use. Note what each means (don't write meanings down) and what each sounds like when said aloud. Now use all five in a four-line poem. (They don't have to make sense. This is for sound values.)

26. List all the words you can with extremely soft sounds. (Soft, is a soft word.) Now make a poem using as many of these words as you can. If you use other words that are not on your list, be sure they are also soft. Now, use hard sounds and repeat process.

27. Put four numbers --1, 2, 3, 4 for instance -- on your paper. Now make a picture in words for each season of the year without using the name -- spring, fall, etc. -- of the season.

28. Have each person write one line on a subject, giving one specific impression relating to it (say, the school). Then collect them all and read them as one poem.

29. Write five good vibrant words on the board -- verbs work well -- and have each writer use all five words in a poem four lines long (or fewer). The subject doesn't matter; you might suggest the weather as a topic.

30. Pretend you are some object in the room (or in the park, in the field, in the neighborhood). Write how you feel or behave, or what kinds of things you will respond to.

31. Using symbols and drawings (but no words) design a card asking for something...a pencil, the loan of a book, a walk, a dialogue, a date, etc. Try out your wish on another student. The idea of the project is to sharpen the ability to communicate without the use of writing or of the spoken word.

32. Pretend you are Abe Lincoln, Moses, Socrates or any other historical figure. Write about how you feel, or the way it was to you.

33. Work with one of your friends. Take turns making a sound vocally, with a part of your body or with something from the environment. As quickly as possible write down a symbol for that sound. Remember, a symbol reflects the meaning of the sound to you as well as the reproduction of the sound. Also, you may have to make up syllables or words.

r
r i
d n
n
p

Share your symbols with others. See if their interpretations of what you have put on paper are what you intended.

34. Write down notes as soon as you awaken about dreams you remember. In storyboards or film, explore the images and "logic" of your dreams.

Recollect and write (in prose) one of your dreams. Select a single aspect of your dream experience which you feel is most interesting and render it in terms of images in a free verse poem.

35. With a group of your friends stand or sit quietly and inconspicuously in separate places where you can observe the same group of people. Jot down words that you associate with the feelings, sounds, expressions of which you become aware. Compare your jottings with your friends. Say the words loudly, quietly, fast and slowly. How does the meaning change with the manner of speech? from person to person? What connections are there between what is meant and the sound of the word? Write a paragraph in which you explore some idea or emotion which you have observed. Find out who else has written about the same idea or emotion so that you may compare and share your insights.

36. Write five sentences on a piece of paper. The first two sentences are to begin with the word "Tree" or any other word of your choice; the third and fourth do not begin with "Tree," and the fifth again begins with the word "Tree."

What formal pattern unifies the sentences in terms of image and theme? What is the subject matter of lines three and four?

37. Read a free verse poem by William Carlos Williams. Compare the diction (language) to the word choices made by Shakespeare in one of his sonnets. (This could develop into a larger discussion about the nature of rhythm and rhyme, and even the "thematic" form of the sonnet -- presentation of a problem, expounding and developing problem and resolution -- as compared to the aims of free verse: natural speech rhythms, etc.)

Out of what circumstances have these two poets written? What were the outside influences upon them? the inside influences? What might some of the topics be if Shakespeare were writing today?

38. If you could save only seven words to use forever, which seven would you save and why?

Source for Ideas 14-38: Gary Carmichael, Lincoln, Nebraska.

39. Sound-Sense Training: Students are asked to bring a blindfold and as many of the following items as they can:

Bells, small instruments, wood, paper, cellophane, pennies, glass jars with lids, empty can, straw basket, rubber bands, shoeboxes, rice, twigs, leaves, playing cards, tennis balls, straws, shells, pebbles, bottle caps, and anything else they could find which makes a sound.

Students then peruse a variety of literary magazines for the first hour, and then read sound-aware descriptions to the rest of the class. I also read aloud selections from Joyce, Poe, and a sound-sensitive article from a current sports magazine.

Students wear blindfolds to avoid the distraction of vision, which is the most overpowering sense. I then manipulate the objects they bring and wait for responses.

The students are instructed to call out sense words and phrases which are special to sound and which describe the sound with the greatest degree of accuracy. This is done for a solid hour, in which I also ask the students to listen for inner voices, imagine themselves falling asleep, or under water, to hear sounds with their ears cupped, to listen to their heartbeats, and to listen for breathing.

This is followed by a writing session. Students are told to concentrate on a single sound, or related group of sounds, describing them so accurately that the reader could hear them. The writing session is then followed by a criticism session.

Source: Carole Schulkind, University of Hawaii at Manoa.

40. Futuristic Writing and Ideas:

A. Write four headlines for the year you reach 35 years of age. Write news articles for one of these headlines.

B. Illustrate and describe the device which will take you to work at age 45.

C. Describe at least six potential uses of the computer. List advantages and disadvantages for at least two of these uses.

D. Write a short science fiction story about life on a space station, a lunar installation or inter-planetary travel.

E. Where will you be fifty years from now? Write a brief description of what you envision you will be doing and where you will be on the following dates: 1986, 1996, 2000, 2016, 2026.

F. Create a new labor saving device describing and illustrating its uses. List the advantages and disadvantages.

G. Design and describe a rapid transit system to be used in your area in the year 2000.

H. Describe or build a hypothetical community in the classroom for the year 2000.

I. Write, tape record and/or photograph a 60-120 second commercial promoting futures study.

J. Examine present architectural designs in housings and building. Conduct an interview with an architect concerning new building materials, present restrictions which prohibit innovative designs and use of these new materials. Design a model home or building for the year 2000, utilizing new materials and innovative designs.

K. Write or interview a State legislator or your congressman concerning present State, Federal land use legislation. Create a local hypothetical land use map providing land for recreation, industry, public and private services, transportation, etc.

L. Collect articles from the newspaper and magazines that foretell of future discoveries and inventions: foods, medicine, electronics, education, transportation, etc. Explain how the projection or invention will affect your life.

M. Write a scenario (narrative describing a sequence of events that might occur in future) describing the effects of computers and robots/humanoids on the home and family.

N. Design a human being of the future. Body parts should reflect your projections for artificial, genetic and environmental changes. For example, if intelligence increases, the head might be larger than the present size.

O. Research one or more inventors and their inventions. Discuss and/or illustrate the impact this invention has had on our society and the world.

Source: Marge Morton, Talented and Gifted Consultant, District 66, Omaha, Nebraska.

41. A. Students in pairs brainstorm after seeing a concrete word on the board. Examples: school, money. One student records the responses on paper.

B. The same pairs brainstorm when an abstract word is written on the board. Examples: freedom, happiness. Responses are again recorded.

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C. Each pair of students puts pairs of words together from their lists - one concrete/one abstract. The pairs of words are supposed to have some meaning to the students. The meaning should not be obvious to others.

D. The meaningful word pairs are studied until each group chooses their two favorite pairs of words.

E. The selected pairs of words are all put on the board. Then groups can challenge each other when they see a pair of words that makes no sense. The students who made up the word pairing must defend their choices.

F. A discussion can follow once all challenges have been completed.

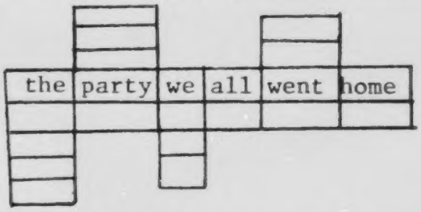
The initial brainstorming words can be changed to suit any unit. I used apprentice (concrete) and freedom (abstract) when my 8th graders were reading Johnny Tremain.

42. Marathon Writing: While listening to a song or sound effects, students try to write continuously, not lifting their pencils to think or rest. This exercise develops fluency and I use it as a warm-up to creative writing. The length of time for this continuous writing is supposed to be increased from about 3 minutes to 15 over a several month period. These exercises are often shared - some students write stories, some list words, some use rhyme or alliteration, etc.

43. Timed crosswords: Solving word scrambles or doing corssword puzzles can be more challenging if a time limit is set for their completion. Gifted students, who often get bored with these types of activities, perk up when they are trying to beat a clock.

Source for Ideas 41-43: Marilyn Hoagland, Pound Junior High School, Lincoln, Nebraska.

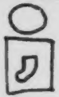
44. Crossword Format: Demanding much more thought is the crossword format where certain vertical sentence words must be so selected that they will also produce additional horizontal sentences:



The task is to fill the blanks in such a way that sentences emerge both horizontally and vertically.

Source: Teaching for Thinking, Leif Fearn, Kabyn Books, 1977.

45. Have students illustrate cliches. Write notes to each other using them. Examples:



(Sock in the eye)

$\frac{\text{stand}}{\text{I}}$

(I understand)

46. Ideas that encourage creative story writing:
   A. A writer's corner
   B. The "Yarn Spinners Club"
   C. An original animal story
   D. Experience stories, from pictures
   E. Guessing stories from book covers
   F. Autobiographies: diaries
   G. Scripts for radio/TV
   H. Scripts for original comic strips
   I. Stories from titles
   J. First story titles
   K. Writing endings to stories
   L. Characters children create

47. Ben Franklin Stories:

Explain 2 or 3 of these famous sayings by Benjamin Fraknlin or write a story ending with one of these.

A. Speech is Silver, Silence is Golden
B. Early to Bed, Early to Rise, Makes a Man, Healthy, Wealthy, and Wise
C. The Early Bird Gets the Worm
D. A Penny Saved is a Penny Earned
E. Don't Put All Your Eggs in one Basket
F. Remember that Time is money
G. God helps them that help themselves
H. Lost time is never found again
I. There never was a good war or a bad peace
J. Keep thy shop and thy shop will keep thee

Source for Ideas 46-47: Diane Dudley, Nebraska Department of Education, Lincoln, Nebraska.

48. The grook was developed by Piet Hein during WW II when the Danes were a subject people under the Germans. One way they could get back at their conquerors was tomake snide little remarks about them in such a way that the Germans didn't realize they were being satirized. So he developed this short poem that doesn't have any set form, but simply makes a statement within a very brief space. I'm sorry that I don't have any samples of his war-time grooks, but at any rate you can see how this poetic form operates.

Examples: BRAVE
To be brave is to behave
bravely when your heart is faint.
So you can be really brave
only when you really ain't.

THE ROAD TO WISDOM

The road to wisdom?-- Well, its plain
and simple to express:
   Err
   and err
   and err again
   but less
   and less
   and less

Source: Dr. Mary Ellen Goodenberger, McCook, Nebraska.

October 12, the discovery. It was wonderful to find America, but it would have been more wonderful to miss it.

Mark Twain, *Pudd'nhead Wilson*

Social Studies Activities

PHILOSOPHICAL AND RELIGIOUS SYSTEMS

SUBJECT AREA

Social Studies

OBJECTIVES

Students will:

1. Investigate the major religious and/or philosophical systems of the world.
2. Be able to discuss the basic tenets of Hinduism, Buddhism, Judaism, Islam, and Christianity.
3. Compare the similarities and differences of the various religions.
4. Hopefully, bridge the chasm of prejudice, widen personal understanding and deepen sensitivity to others.

DESCRIPTION

Below is an outline of a unit on philosophical and religious systems.

ACTIVITIES

1. Read, discuss, and develop detailed study guides on the basic tenets of Judaism, Christianity, Islam, Hinduism, and Buddhism.
2. Take a guided tour of the major religions in the area and discuss their experiences in seminar fashion.
3. Read and answer pivotal questions related to Siddhartha by Herman Hesse.
4. Give oral reports on contemporary issues related to religions, i.e., the Significance of the Dead Sea Scrolls.
5. Demonstrate certain liturgical ritual--i.e. 1) Yoga presentation along with a commentary on the significance of the exercises as a pre-requisite for meditation 2) an actual student conducted meditation.
6. View and critique film, "The Major Religions of the World."
7. Demonstrate an absorption of ideas and attitudes acquired by presenting a simulated World Council of Churches.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application, synthesis, evaluation, receiving, responding, valuing, organizing and characterizing.

CONTRIBUTED BY

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MAN'S ROLE IN THE WORLD

SUBJECT AREA

Social Studies

MATERIALS

Films:

Cooperation Is Our Business, International Film Bureau, 22 minutes.

A Plague On Your Children, Time-Life Films, 72 minutes

Tilt (1972) University of California, 20 minutes.

Who Owns The Moon? Syracuse Films, 17 minutes (1968).

Earth, No Vacancy: Limits To Growth (1973), 22 minutes, Syracuse Films.

Food Or Famine, Shell Film Library, 28 minutes.

H-H Factor, United Presbyterian Church, La Grange Center, 14 minutes.

Life In The Balance, Modern Talking Picture, 30 minutes.

People By The Billions (1961), University of California EMC, 28 minutes.

Standing Room Only (1967) Contemporary/McGraw-Hill Films, 25 minutes.

Essay On War, EBE, 23 minutes.

But Who Shall Feed the World?

Graphs and information from World Facts and Trends, John McHale, Collier Books (New York, New York, 1972).

OBJECTIVES

Upon completion of this learning experience, each student will present a five-minute public service announcement (video-taped) which

a) Describes a world problem.
b) Shows statistically how this problem could be of great concern to the future of the world.
c) Presents possible solutions to the problem.
d) Explains why Americans should do something about this problem and how Americans as individuals can take action to solve it.

Students will:

1. Demonstrate their ability to interpret data by completing exercises which ask them to make observations on graphs and charts dealing with

world problems, draw assumptions from the data presented, make comparisons and show relationships, and extrapolate into the future.

2. Explore and discuss their own values on man's obligations to man by writing their answers to six questions delaing with the film But Who Shall Feed The World?

3. Show their understanding of the problems created by over-population by making a relevance tree on the world-wide causes and effects of over-population.

4. Discuss the meaning of world interdependence and the importance of cooperation in solving world problems.

5. Students will write a paragraph discussing five ways to avoid war.

DESCRIPTION

Most of the problems which face Americans today are global in nature. We are quickly learning that we cannot isolate ourselves from the rest of the world nor can we solve our own problems without cooperation from other world communities. Solving world problems relies totally on the realization by all countries of the world of our growing interdependence.

Our students need to not only understand the problems facing us today but they need to realize, discover, create the many alternative solutions to these problems. And finally, they must realize that solving these problems depends upon both the individual and the organized efforts of man. McHale stated in his book, World Facts and Trends, "We should underline here, finally, that in terms of future options and alternatives, that the solution(s) to our most critical world problems are indeed well within our developing scientific and technological capabilities--but it will require a more massive undertaking than is presently evident in our pious hopes and reliance on traditional practices."

ACTIVITIES

1. Have your students study the attached graphs and complete the following exercises:

   Chart #1 - After careful study of this chart, complete the last three squares under "population to reach."

   Describe how you reached your answers to the above question.

   Draw a relevance tree on world-wide causes and effects of over-population.

   Chart #2 - Define "developed" and "underdeveloped" region. Give examples of each. List at least five reasons why population growth is higher in underdeveloped regions.

   Chart #3 and #4 - What assumptions can you make about the populations of Asia and North America and the amount of protein the people of each country consume daily?

Chart #5 - Define "calorie." According to the chart, how many calories would meet the adequate daily requirement for an individual? Which world regions have more than the adequate daily requirement? Which world regions have less than the adequate daily requirement? How many calories on the average does a person in North America eat daily? In Asia? Which world region has the largest per person daily consumption of calories?

Chart #6 and #7 - Write ten observations you can make from these charts about world education.

Chart #8 - Study charts 6, 7 and 8. Describe any relationships you can find.

Chart #9 - Define GNP (Gross National Product). What relationship does the chart show between GNP and population?

Now study chart #10 and read the attached sheet of interesting statistics. Then make any additions you feel necessary to your relevance tree.

2. Show the film But Who Shall Feed the World? Then have your students write their answers to the following questions:

   a) Should America as the richest nation in the world help feed the poorer nations of the world? If yes, explain why. If no, explain why not.

   b) What other ways can Americans help the more underdeveloped countries of the world. Discuss as many possibilities as you can think of.

   c) What do you think is the best solution to the problem of overpopulation? Explain your answer.

   d) Should underdeveloped countries pass laws limiting the number of children allowed per family? Why or why not?

   e) Should the U. S. and other developed countries pass laws limiting the number of children per family? Why or why not?

   f) List at least six ways in which you as an individual can help solve the population crisis and the problems which result from it.

3. Play the "Global Futures Game" An Earthrise Simulation of the World. Write Earthrise, P.O. Box 120, Annex Station, Providence, Rhode Island 02901 or call: (401) 274-0011. See attached advertisement.

4. Ask your students to obtain a pen pal in an underdeveloped or developing country. Addresses to write for pen friends are on the attached sheet.

Read and discuss "As Others See Us"

5. View and discuss the film An Essay On War.

Study the United Nations. Discuss - What has been the role of the UN in the past? What role do you think the UN will play in the future?

Play the simulation "Alternatives to War" (included in this packet).

6. Have your students present a 5 minute public service announcement. This can be done individually or in groups. Video-tape their presentations. Perhaps a local TV station will want to broadcast some of them.

Students should be evaluated on: 1) their creativity of presentation, 2) their understanding of the problem, 3) their ability to explain the problem, 4) their ability to think divergently in discovering alternatives or possible solutions, and 4) their appeal to the public in urging them to take action.

JUST PLANE INQUIRY

SUBJECT AREA

Social Studies, All

OBJECTIVES

Students will be able to identify the list of rules through questioning.

DESCRIPTION

The inquiry approach is excellent to use for developing flexible thinking. Here's one idea for its use.

ACTIVITIES

Pass out a copy of the numbered rules below.

Tell students they are to identify them by asking yes or no questions until the origin is discovered.

1. Don't take the machine in the air unless you are satisfied it will fly.
2. Pilots should carry hankies in handy position to wipe off goggles.
3. In case the engine fails on take-off, land straight ahead regardless of obstacles.
4. No machine must travel faster than man can walk.
5. If you see another machine near you, get out of its way.
6. Do not trust altitude instruments.
7. Pilots will not wear spurs while flying.
8. If an emergency occurs while flying, land as soon as you can.

These are actual regulations given to pilots in the early 1920's. (From United Airlines).

SKILLS BEING DEVELOPED

Flexibility, synthesis.

CONTRIBUTED BY

Source unknown.

AMERICAN HISTORY IDEAS

SUBJECT AREA

Social Studies

OBJECTIVES

Various

DESCRIPTION

Here are some ideas for extension activities in American History.

ACTIVITIES

Ads for Settlers

Write an ad to attract settlers to the New World. Include drawings, pictures, descriptions, etc. if you desire.

Imperialism

Split class into five sections. Each group is responsible for teaching an assigned area during the U.S. expansion 1898-1914.

#1 Spanish-American War
#2 Acquisition of Philippines, Hawaii, Samoa
#3 China
#4 Panama Canal
#5 Mexico

Lectures, quizzes, maps, worksheets etc. can be used to teach the topic for about 30 minutes. A panel discussion is held after each group has taught the basic concepts. "Should the U.S. carry the flag overseas?"

SKILLS BEING DEVELOPED

Application, synthesis, evaluation

CONTRIBUTED BY

Terri Robinett, Northwest High School, Omaha, Nebraska.

THE NATURE OF REVOLUTION

SUBJECT AREA

Social Studies

MATERIALS

1. Films

   a. *Marx Was Here*. Produced by the BBC. Time-Life Films, Chicago.
   b. *The World Turned Upside Down* (The Story of the Russian Revolution). Produced by the BBC. Time-Life Films, Chicago.
   c. *The French Revolution*. Part I: The Death of the Old Regine and Part II: The Birth of a New France. Produced by NBC. Encyclopedia Britannica Educational Corporation, Chicago.

2. Filmstrips - All filmstrips are in color and have cassettes and recordings.

   a. *The French Revolution* (2 filmstrips). EAV Productions, Pleasantville, New York.
   b. *The Russian Revolution* (2 filmstrips). EAV Productions, Pleasantville, New York.
   c. *The 1848 Revolutions* (2 filmstrips). EAV Productions, Pleasantville, New York.
   d. *The Ideas of Karl Marx* (2 filmstrips). EAV Productions, Pleasantville, New York.
   e. *Pepys's London* (1 filmstrip). EAV Productions, Pleasantville, New York.
   f. *The American Revolution: Two Views* (4 filmstrips). EAV Productions, Pleasantville, New York.
   g. *Great Episodes in British History: The Puritan Revolution* (1 filmstrip) Encyclopedia Britannica Educational Corp., Chicago.
   h. *Continental Europe in Revolution (1789-1890)* (7 filmstrips). Encyclopedia Britannica Educational Corp., Chicago.

3. Bibliography

Adams, Brooks	*The Theory of Social Revolutions*
Amann, Peter (ed.)	*The Eighteenth-Century Revolution*
Arendt, Hannah	*On Revolution*
Artz, Frederick	*Reaction and Revolution, 1814-1832*
Beals, Carelton	*The Nature of Revolution*
Breuning, Charles	*The Age of Revolution and Reaction, 1789-1850*
Brinton, Crane	*The Anatomy of Revolution*
Burke, Edmund	*Reflections on the Revolution in France*
Burns, C. D.	*The Principles of Revolution*
Carswell, John	*The Descent on England: The English Revolution*
Chamberlain, W. H.	*The Russian Revolution, 1917-1921*
Dahl, R. A.	*After the Revolution: Authority in a Good Society*
Davies, J. C.	*Human Nature in Poitics*
Dowd, D. L. (ed.)	*The Age of Revolution, 1770-1870*

Duveau, Georges	1849: The Making of a Revolution
Eastman, Max	Marx, Lenin, and the Science of Revolution
Edwards, L. P.	The Natural History of Revolution
Engels, Frederick	The German Revolutions
Forster and Greene	Preconditions of Revolution in Early Modern Europe
Gasset, Jose Ortega	The Revolt of the Masses
George, C. H.	Revolution: European Radicals from Hus to Lenin
Gershoy, Leo	The French Revolution, 1789-1799
Gipson, L. H.	The Coming of the Revolution, 1763-1775
Greenlaw, R. W. (ed.)	Economic Origins of the French Revolution
Hill, Christopher	Intellectual Origins of the English Revolution
Hyndman, H. M.	The Evolution of Revolution
Knollenberg, Bernhard	Origins of the American Revolution, 1759-1766
Koehan, Lionel	Russia in Revolution, 1890-1921
Kohn, Hans	Revolutions and Dictatorship
Le Bon, Gustave	The Psychology of Revolution
Lefebvre, Georges	The Coming of the French Revolution
Lenin, V. I.	The State and Revolution
Lubasz, Heinz (ed.)	Revolutions in Modern European History
Maguire, J. J.	The Philosophy of Modern Revolution
Mazlish, Kaledin and Ralston	Revolution: A Reader
Meisel, James	Counterrevolution: How Revolutions Die
Miller, J. C.	Origins of the American Revolution
Palmer, R. R.	The Age of the Democratic Revolution
Pottes, G. S.	The Process of Revolution
Rude, George	The Crowd in the French Revolution
Sievers, A. M.	Revolution, Evolution, and the Economic Order
Sorokin, P. A.	The Sociology of Revolution
Sydanham, M. J.	The French Revolution
Taylor, P. A. M.	The Origins of the English Civil War
Tocqueville, Alexis de	The Old Regime and the French Revolution
Toynbee, A. J.	America and the World Revolution
Trevelyan, G. M.	The English Revolution, 1688-1689
Trotsky, Leon	The History of the Russian Revolution
Tucker, R. C.	The Marxian Revolutionary Idea
Venturi, Franco	Roots of Revolution
Wolfstein, E. V.	The Revolutionary Personality

OBJECTIVES

The student will be able to:

1. Differentiate between forms and types of revolution (i.e., coup d'etat, palace revolt, civil war, insurrection) (C1; A1,4)

2. Identify the primary causative factors which lead to revolution (i.e., social, political, economic, intellectual) (C2,3)

3. Gain the ability to make generalizations concerning the nature of revolution derived from a study of facts (C3,4; A4)

4. Understand the causes and effects of revolution under different forms of government (i.e., monarchies, republics, aristocracies, democracies) (C4,5)

5. Discover the difference between overt and hidden motives involved in revolution and those who plan and execute the action (C4,5; A1)

6. Analyze and weigh evidence as he searches for the truth (C3,4,6; A2,3)

7. Reveal the problems of man in modern society, to analyze his present feelings, and to plot his probable path to the future through a study of four revolutions (the English, American, French, and Russian) (C2,3,5,6; A5)

8. Develop, through the study of specific revolutions, a knowledge of values which have stood the test of time (C5,6; A3,5)

ACTIVITIES

1. All students will view the NBC-produced film, "The French Revolution," as an overview of the unit. By observing this film, students will realize the total scope of a revolution and thus be better informed as to basic causes and effects.

2. The class will utilize a combination of learning techniques throughout the entire unit. These include: lecture, group assignments, individualized instruction, oral and written reports, debates, and simulations.

3. Textbook readings (Palmer and Colton: A History of the Modern World), bibliographical selections (see: Bibliography), and other materials (periodicals and audio-visual aids) will be assigned throughout the entire study period.

4. Each student will prepare a comparative list of the major figures, describing the work and significance of each, who were responsible for the organization and implementation of the English, American, French, and Russian Revolutions.

5. Each student will prepare a visual project (i.e., poster, transparency, bulletin board) in which emphasis is placed upon intellectual ideas which promoted revolutionary activities in one of the four societies under consideration.

6. Each student will become acquainted with the works of several historians (suggested number :5) whose theories concerning any of the four revolutions to be studied seem worthy of consideration. Each theory will be critically analyzed and evaluated. Then the student will organize the four or five theories into a well-prepared essay, formulating a concise and succinct synthesis of his findings.

7. The class will be divided into four groups. Each group will prepare a debatable research paper to be presented to the entire class. The four issues which will be presented are to be built around the following questions:

a. Was the French Revolution a Western revolution?
b. Were the Marxists revolutionaries or reformers?
c. Was the American Revolution a "true" revolution?
d. Was the English Revolution politically motivated or religiously inspired?

8. The class will be organized into four tables, each table of four students assigned to a particular theory of revolution (i.e., loss in warfare, common grievances, corruption in leadership). Each table will defend or attack the theory, producing evidence which will support its contention.

9. Small groups (three or four students) will critique films and filmstrips in an attempt to determine whether propaganda instruments or subjective methods were used in producing the visual.

10. Using the Great Books of the Western World, the students will organize into pairs and attempt to understand and analyze the various concepts of revolution as presented by eight philosophers: Aristotle, Hegel, Hobbes, Kant, Mill, Rousseau, and Thucydides. The students will then present for small and large group discussion and argument, the ideas of these men.

11. A written dialogue, solving the following problem, will be prepared by each student:

Time: 1513
Location: Florence
Situation: Florence is engaged in a series of violent activities on the part of several families, notably the Medici, in an effort to gain political control of the city-state.
Problem: The student will develop a conversation between the three persons in one of the groups below. The dialogue will center around how to solve the tense situation and bring political stability to Florence.

a. Machiavelli
   Locke
   Plato

b. Henry VIII
   Louis XIV
   Frederick II

c. Charles V
   Alexander II
   Joseph II

d. Lenin
   Hitler
   Wilson

e. Trotsky
   Robespierre
   Bakunin

12. A role-playing dilemma is performed in which an effort to solve the following problem takes place:

Time: 1513
Place: Florence
Situation: Florence is engaged in a series of violent activities on the part of several families, notably the Medici, in an effort to gain political control of the city-state.
Problem: The students will divide into five groups of three persons each. The student will assume the role of the one character with whom he wishes to identify. Each student will then become familiar with the social and political thoughts of that one

historic figure and be willing to defend the character's views pertaining to the situation as it exists in Florence.

a. Machiavelli
   Locke
   Plato

b. Henry VIII
   Louis XIV
   Frederick II

c. Charles V
   Alexander II
   Joseph II

d. Lenin
   Hitler
   Wilson

e. Trotsky
   Robespierre
   Bakunin

Questions for Discussion

1. Compare and contrast the Puritan Revolution and the Glorious Revolution.

2. Why did not the oppressive policies of the despots lead to revolution everywhere instead of simply in France and England?

3. Why did absolutism decline in England at a time when it was rising on the continent?

4. Upon what grounds does Thomas Hobbes justify absolute government?

5. What part did the rights of the people play in the English Revolution?

6. "In its origin and initial objectives the French Revolution was essentially a middle-class movement." Substantiate or refute this statement.

7. Compare in as many ways as you can the American Revolution with the French Revolution. On the basis of your knowledge of the French Revolution, would you consider the American Revolution a true revolution?

8. In what ways and to what extent was the American Revolution a cause of the French Revolution?

9. "The French Revolution made the career of Napoleon inevitable." Prove or disprove this statement.

10. Compare the French Declaration of the Rights of Man with the English Bill of Rights.

11. What do the food riots tell us about the role of the lower classes in the French Revolution?

12. Study the Constitution of the United States and see what features you can discover in it that were really original and not derived from English and French political theory and from English institutions and practices.

13. Compare the actualities of the Bolshevik revolution in Russia with the Marxist theory of revolution.

14. Was Lenin justified in affirming the existence of a Communist morality?

15. Why did Lenin deny the possibility of freedom so long as the State exists?

16. "The Puritan Revolution, like others, produced its extremists." Explain and identify.

Evaluation

1. Each student will construct a paper comparing the English, American, French, and Russian Revolutions. Stress must be placed on the ability to analyze and synthesize facts and develop them into a well-organized and cohesive essay. This essay should be designed to pursue and describe the similarities unique to all revolutions.

2. Historians usually propose and then defend a thesis as to what is felt to be the most valid factor behind a revolution. The class will be divided into pairs of students. Each pair will be asked to prepare oral arguments attacking and defending one thesis used by one of these historians.

3. A hypothetical state, New Atlantis, will be established in which conditions will be "ripe for a revolution." The students will engage in role-playing positions, pro and anti-establishment, in which they will propose solutions to alleviate or eliminate the irritants which are the source of major grievances. This simulation will be the culminating activity of the study unit and the outcome of this activity will serve as a springboard into the next unit. "Individualism and Nationalism: The Two Political Horns of the Nineteenth Century."

SKILLS BEING DEVELOPED

C1, A1, etc., refers to the nature and level of the objective as described by Bloom and Krathwohl. C1 is an objective in the cognitive domain at the 1st or knowledge level; A1 is an objective in the affective domain at the 1st or awareness level.

Cognitive:	Affective:
1. Knowledge	1. Receiving
2. Comprehension	2. Responding
3. Application	3. Valuing
4. Analysis	4. Organization
5. Synthesis	5. Characterization
6. Evaluation	

CONTRIBUTED BY

McLean Mitchell, Forsyth Country Day School

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MIDDLE EAST PEACE TALKS-A SIMULATION

SUBJECT AREA

Social Studies

MATERIALS

Each team can use as many props as necessary. Native dress is recommended, but posters, flags, or anything that will help make the country's viewpoint more convincing can be used.

OBJECTIVES

Students will:

1. Be able to model the roles of Middle Easterners and adopt their points of view.
2. Engage in many levels of thinking while attacking the problem of Middle Eastern strife.

DESCRIPTION

This is a simulation of Middle East peace talks done by Betty Walker which received community attention and was extremely successful with the students.

ACTIVITIES

This was read to the students the day the simulation was introduced:

Sit back and relax for a minute and let your imagination travel silently to the other side of the world. You are sitting in a large, plushy decorated room watching a group of about 30 men of various skin tones, who are dressed in many different types of outfits. The room is warm, not only because of the temperature, but because of the air of excitement, suspense, and anticipation which is felt by everyone. The men, seated around the table, in what appears to be four divisions, are talking in low voices while the eyes of the world, through a myriad of television cameras are focused on them. On either side of the podium are seated two men whose faces have been seen in the news frequently for the last two months, the smiling and poised President Sadat of Egypt and the concerned-looking Premier Begin of Israel. Other faces are easily recognized--Yasir Arafat in his familiar checked headdress framing his sweating face; the handsome, mustached King Hussein of Jordan and King Khalid of Saudi Arabia. Suddenly, a gavel raps on the podium and the meeting commences. In the back of your mind you wonder, what would it be like to be a world leader and meet with other world leaders to make decisions that would reach far into the future? What would it be like to know that your ideas could help bring peace to the world or cause the end of the world? What would it be like to want peace for the world, but be unable to get it for fear that some of your friends would desert you? (Saudi Arabia)

Well, you are going to get your chance, to find out the answers to these questions. For a short time you are going to assume the roles of some of the leaders of the Middle East. You are going to do this by finding out what it's like to live in the Middle East, what these men think about Sadat and his ideas, about the Israelis and what should be done in the Middle East. You are going to bring your ideas to the conference table just as these men would and talk just as they would.

The Problems: Players will define the problems according to their viewpoints on the following issues:

A. Creation of a Palestinian entity
B. Arab vs. Jew
C. Geneva vs. Cairo
D. Suez Canal
E. Sinai Peninsula, West Bank, Gaza Strip
F. The U. S. Viewpoint
G. The Soviet Influence

Objectives:
1. Each player should try to help reach a group concensus or agreement on the issues.
2. Each player should try to gain as many points for his/her team as possible.

Characters and Goals: Each player is assigned a role representing a country and each player should try to benefit his/her country and team in any way possible.

Rules and their administration:

A. Procedural rules--each team will give an opening statement of their viewpoint. This can be done by one team member or divided among several team members. After the four viewpoints have been heard, negotiations will begin; the players will be recognized by the mediators (teachers) and given the opportunity to speak.
B. Mediational rules--when an impasse is reached in the negotiations, players should consider compromise. The mediators may call on various players to restate viewpoints.
C. Behavior Constraint rules--one player may speak at a time. Mediators will call on players when it is their turn; the player who has the floor may choose to turn it over to a different team player, but not one of his own team members.
D. Police rules--points can be given or taken away by the judges, based on the above rules. Also points can be gained by considering the following questions.

Judging: Three or more adults can be invited to judge the simulation, preferably people with a background in education and/or a knowledge of current events. The following are criteria to consider in judging:

1. Opening Statement - Each of the four teams will give an opening statement of their viewpoints. This should be no longer than 5 minutes.

l

2. Bloom's Taxonomy
   - A. Knowledge - of basic facts
     of others' viewpoints and understanding of these viewpoints
     of the issues and problems
     Native dress
   - B. Application of basic facts and viewpoints to this situation
   - C. Analysis of the situation - what are your predictions?
     What are your interpretations?
   - D. Synthesis - what are your solutions or suggestions? Do you see any new possibilities?
   - E. Evaluation - what are your opinions about the other nations?
     about the situations?
     about the others' proposals?

3. Creative Skills
   - A. Fluency - how many ways are there of defining the problems?
     How many ways can the problems be solved?
   - B. Flexibility - how many ideas can be combined?
     How many ideas have similarities?
   - C. Originality - what did we think of, that the other groups didn't think of?
   - D. Elaboration - what can we add to the others' ideas? What can we add to our own ideas?

Evaluation and Feedback: Were the objectives reached?
How can the game be improved?

The Groups and Characters

Egypt	Israel
President Sadat	Premier Begin
Aide Hassan Kamel	President Ephraim Katzir
Acting Foreign Minister Ghali	Deputy Premier Yigael Yadin
War Minister Gamasy	Foreign Minister Moshe Dayan
Information Minister Odeh	Chief Negotiator Elisha Ben Elissar
Ambassador to U.S. Ashraf Ghorbal	Major General Avraham Tamir-expert of buffer zones, observer of points and navigation lanes

For Sadat	Against Sadat
SUDAN - Jaafar Nimeiry	PLO-Yasir Arafat
MOROCCO-King Hassan	ALGERIA-Boumedienne
OMAN-Sultan Qubas	IRAQ-Bakr
SOMALIS-Sida Barre	LIBYA-Kaddfi
JORDAN-King Hussein Premier Mudar Badran	SYRIA-Hafez Assad Foreign Minister Abdel Halim Khadam (Moscow)
TUNISIA-Bourguiba	LEBANON-Sarkis
SAUDI ARABIA-King Khalid Crown Prince Fahd	

SKILLS BEING DEVELOPED

Knowledge, application, analysis, synthesis, evaluation, fluency, flexibility, originality, elaboration

CONTRIBUTED BY

Betty Walker, Resource Consultant, Project ESURG, ESU #2, Fremont, Nebraska 68025.

EXTRAPOLATION

SUBJECT AREA

Social Studies, Language Arts, Science

OBJECTIVES

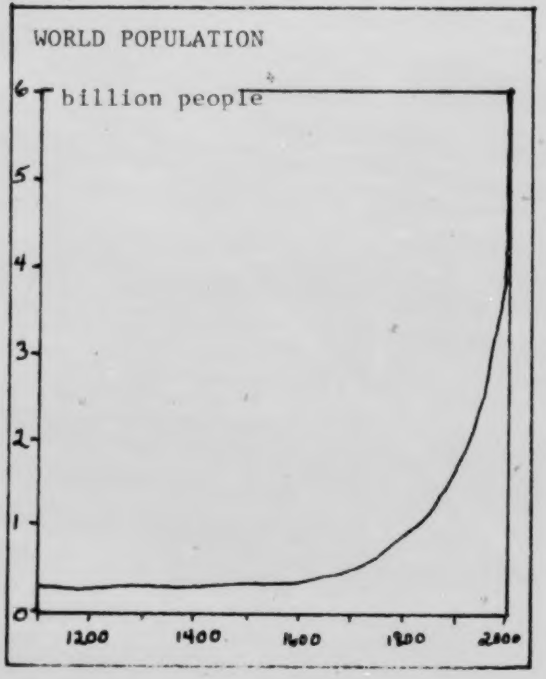
Students will be able to extrapolate by using existing facts.

DESCRIPTION

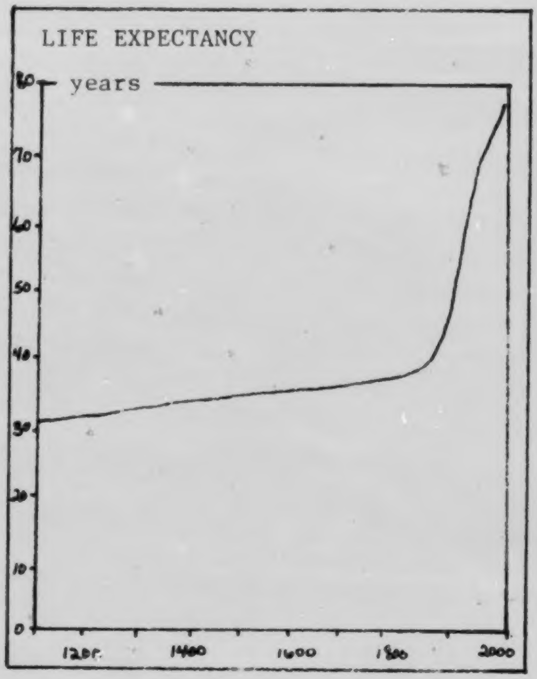
Extrapolation is the method used to predict or hypothesize what future or unknown facts will be by using the facts presently known. To extrapolate, you must first plot on a graph what all your known facts are. The resulting line or curve graph is an indication of present trends. To extrapolate into the future, you continue the line or curve of the graph. This line indicates what the future facts will be if all influences remain the same.

ACTIVITIES

Below are two examples of graphs which have been extrapolated. Look them over carefully and be sure you understand how the extrapolation has been done.

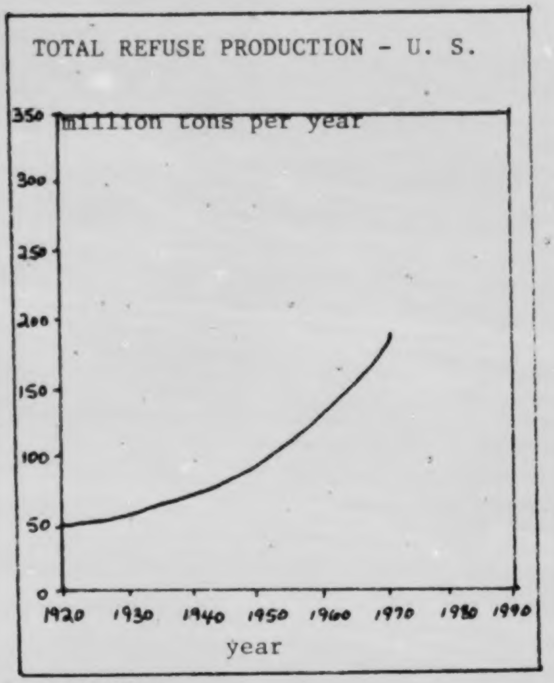


GRAPH A

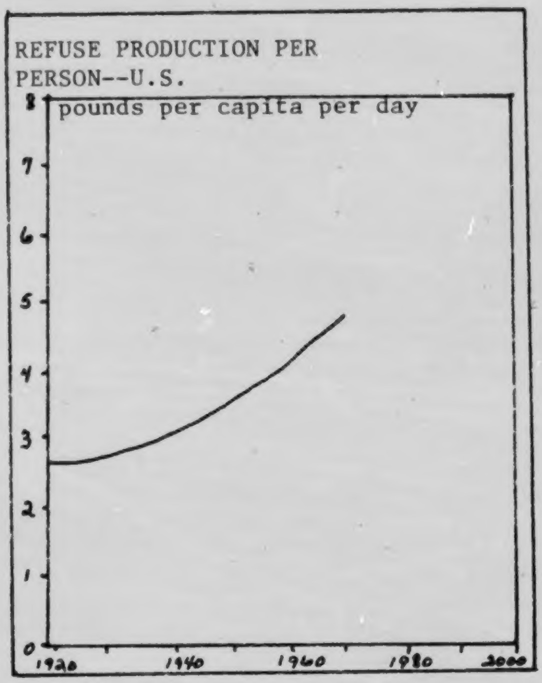


GRAPH B

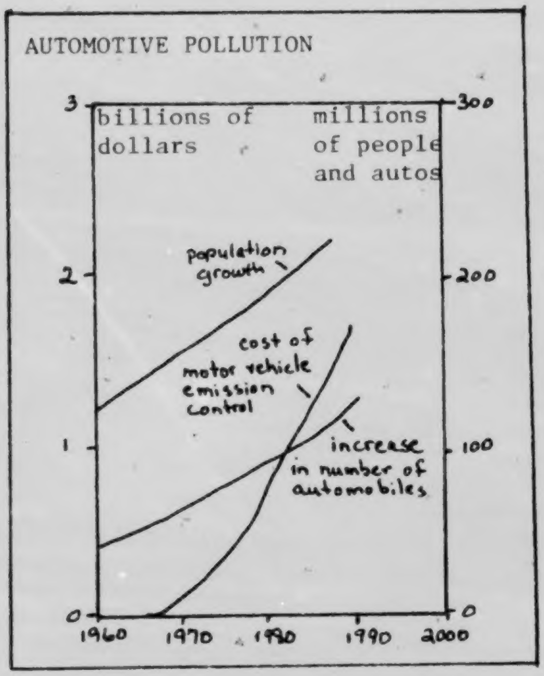
Here are several examples of extrapolation for you to try. Carefully project the facts onto the future and see what your graphs look like.



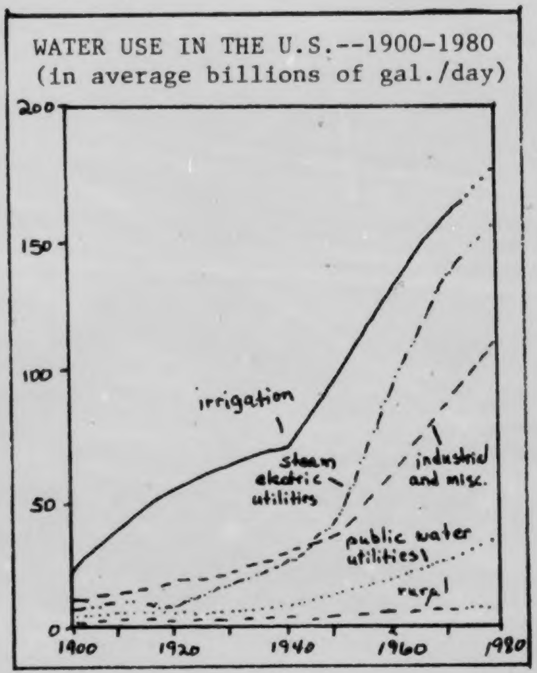
GRAPH C



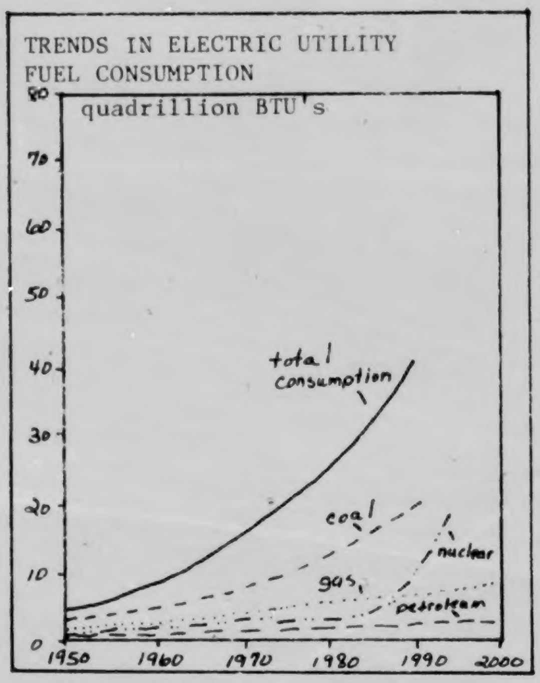
GRAPH D



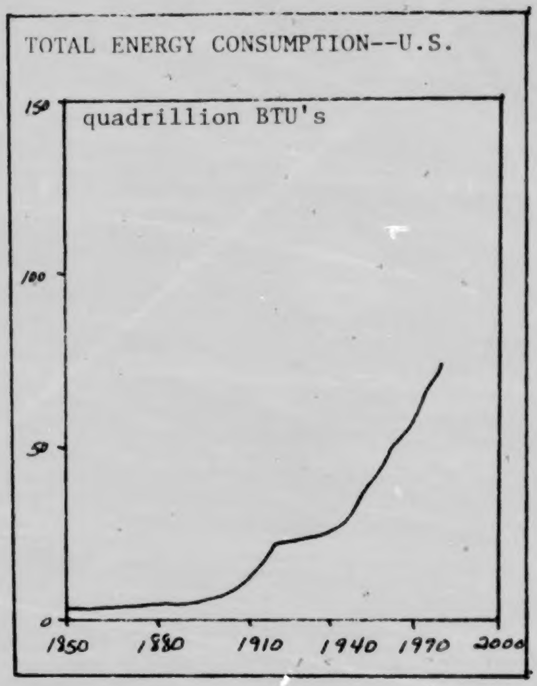
GRAPH E



GRAPH F



GRAPH G



GRAPH H

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation.

CONTRIBUTED BY

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NATIONALISM

SUBJECT AREA

Social Studies

MATERIALS

Filmstrip, The French Revolution. Film, Nightmare in Red Parts 1 and 2 -- Winston-Salem/Forsyth County Schools Film Library,

Books:
Fenton: The Shaping of Western Society, Ch. 10, 12 (each student has his own copy)
Rossell: A World History, Ch. 25, 32, 37
Leinwand: The Pageant of World History, Ch. 18, 19, 21, 28
Welty: Man's Cultural Heritage, Ch. 22, 25, 26
Feder: Viewpoints in World History, Ch. 9, 16 (there are between 15 and 20 copies of these four books located in the classroom)
Gershoy: The French Revolution and Napoleon
Lefebvre: The Coming of the French Revolution
Brinton: The Anatomy of Revolution (a copy of these three books is located in the classroom)

Sources of students' choice outside the classroom.

OBJECTIVES

1. By the third day of the unit, each student will be able to give orally a brief definition of nationalism.
2. By the end of the three-week unit, each student will be able to show, orally or in written work, that nationalism has served to unite men, but has also led to grave conflicts.
3. By the end of the three-week unit, each student will be able to show, orally or in written work, that nationalism, although common to many groups, has many causes.
4. By the end of the three-week unit, each student will be able to show, orally or in written work, that there are several different forms of nationalism.
5. By the end of the three week unit, 54 of the 58 students will be able to identify and describe on a written test, at least two different forms of nationalism.
6. By the end of the first week of the unit, 54 of the 58 students will be able, in writing, to describe the nationalism in England during the Tudor monarchs.
7. By the end of the first week of the unit, 54 of the 58 students will have written an essay showing the role of nationalism in the unification movement of either Germany or Italy.
8. By the sixth day of the unit, 54 of the 58 students will be able to present orally, to those not familiar with the subject, information on the unification of Germany or Italy, showing in their presentations a thorough understanding of the situation.

9. By the end of the three-week unit, each student will be able to give, on a written test, four similarities and four differences in comparing the unifications of Germany and Italy.

10. By the end of the three-week unit, 54 of the 58 students will be able, on a written test, to list and describe the five phases of Brinton's "Cycle of Revolution."
11. By the end of the three-week unit, 54 of the 58 students will be able to show, orally or in written form, how nationalism caused the French and Russian Revolutions.
12. By the end of the three-week unit, 54 of the 58 students will be able, on a written test, to fit both the French and the Russian Revolution to Brinton's "Cycle of Revolution."
13. By the end of the three-week unit, each student will be able to discuss, in depth, one aspect of European history between 1600 and 1900 that is of major interest to him.
14. Through a study of different forms of nationalism, each student will be able, by the end of the unit, to demonstrate the possible modern-day impacts of nationalism on a country or a group of people.

DESCRIPTION

This instructional plan is designed to instigate and increase the understanding of the concept of nationalism on the part of 58 students enrolled in the two World Studies classes. The plan will allow students to recognize nationalism and its causes and effects in the modern world by studying former examples of this concept. The unit of study will last for three weeks, with the classes meeting for 47 minutes each day.

ACTIVITIES

1. Students will be introduced through teacher presentation to the concept of nationalism and will be informed of objectives for the unit. Levels 1,2.
2. Students will be given a list of Rulers and Regimes in Europe between 1500 and the present (compiled by the teacher) to use as a reference guide for the unit of study. A brief explanation of the guide will be made. Level 1.
3. Students will then begin an independent study of nationalism in England under the Tudor monarchs and will be ready for class discussion on the next day. Levels 1,2.
4. There will be a class discussion of Tudor Nationalism. Levels 1,2,6.
5. Students, using various classroom sources, will research nationalism in either Germany or Italy and its effect in causing the unification of those countries. Students will turn in an essay of at least 250 words on the subject. Levels 1,2,5,6.
6. Through student-led discussion, the students will share information on the country they researched with students who researched the other country. Levels 1,2,6.
7. The students will be introduced to nationalism in France through a teacher presentation on the French Revolution. This will be followed by a class discussion on materials read outside of class concerning Rousseau's Social Contract and Lockes' Two Treatises of Government. Levels 1,2,4,5,6.

8. Students will utilize materials (books and filmstrip) on the French Revolution, taking notes as they do so. Levels 1,2.
9. Students will analyze the French Revolution in discussion, determining its causes and effects, and the effect of nationalism on the French people. Levels 4,5,6.
10. Students will be introduced to the Russian Revolution by teacher presentation. Levels 1,2.
11. Two movies on the Russian Revolution (each 17 minutes long) will be viewed. Levels 1,2.
12. Students will analyze the Russian Revolution in discussion, determining its causes and effects and the effect of nationalism on the Russian people. Levels 4,5,6.
13. During the unit, students will have been investigating an area of particular interest to them relating to Europe between 1600 and 1900. On this day, the class will be divided into small groups so that each student will be able to share his findings with other members of the class. Levels 1,2,5.
14. Students will be presented with a synopsis of Crane Brinton's "Cycle of Revolution" and it will be analyzed through teacher-led discussion. Levels 1-6.
15. Students will be tested in class. Levels 1-6.

Evaluation

Students will be evaluated on several different types of performances during this unit. These are:

1. Presentation of individual research to a group.
2. Discussion participation.
3. Written essay.
4. In-class test.

SKILLS BEING DEVELOPED

1. Knowledge
2. Comprehension
3. Application
4. Analysis
5. Synthesis
6. Evaluation

CONTRIBUTED BY

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POLITICS TODAY IN THE USA

SUBJECT AREA

Social Studies

MATERIALS

films:

Mr. Rhooney Goes to Washington
Political Parties (North Carolina Public Library Film Service)
Pressure Groups (North Carolina Public Library Film Service)
Our Election Day Illusions: The Beat Majority (North Carolina Public Library Film Service)
Good Morning, Freedom: The Sixties (North Carolina Public Library Film Service)

filmstrips:

Congress (Burke County Schools)
Politics and Government (Burke County Schools)
Government In Action (Burke County Schools)

books:

Winter - Burger, Robert, The Washington Pay-off
Wise, David, Democracy Under Pressure
Ferguson, John, The American System of Government
Wright, Emmett Jr., Political Leadership in America
U.S. News and World Report, U.S. Politics: Inside and Out
Boskin, Joseph, and Kinsky, Fred. The Oppenheimer Affair
A Political play in three acts

other:

Daily newspaper
National newspaper
National news magazine
TV newscasts

OBJECTIVES

The student(s) will be able to:

1. Define a list of terms and phrases relating to politics and government. They will demonstrate their success by defining 90% of them. A few terms would be: power politics, corruption 1970's style, primaries, etc. (C-1)

2. Distinguish between the real political/governmental world and the theoretical model within the constitution. (C-2)

3. Develop alternate methods of selecting presidential candidates or candidates for any political office. (C-3)

4. Analyze and detect if changes have occurred in the makeup of political parties over the last seventy-six years. (C-4)

5. Analyze the similarities and differences in the Presidential candidates and illustrate those through verbal debate. (C-4)

6. Write a paper in which a review is made of the American political process. (C-5)

7. Judge the success of our political process over the past decade. (C-5)

8. Share their personal feelings as to how our present government operates. (A-1)

9. Devise games to illustrate how governmental bureaus work. Voluntarily each student will select one part of the game to play. (A-2)

10. Manage a major department within the government, through role playing. (A-5)

DESCRIPTION

This unit is constructed with the hope that ultimately students will benefit from it in a variety of ways. In so doing they may be able to participate, change, and eventually help to improve the American political structure. Additionally, it is hoped this unit will stimulate divergent, creative solutions for political/governmental problems in the future.

The highest levels of thought involving the use of evaluation, synthesis and analysis are contained within this unit. For example, decision making within the area of values clarification is an integral part. Thus this unit is most appropriate for G/T students.

ACTIVITIES

Introductory

1. Construct a model drawing of the American political scene prior to the time the unit is to begin. Structure is so that it includes both how our political/governmental system really works, and how it works in theory. Ask the students to write down their reactions to the model as to how different or similar it is to their own concepts.
2. Discuss why the experts have so much difficulty in predicting success in the political arena.

3. Within the next few days of the unit show parts of the Democratic and Republican National Conventions. Include flashbacks from earlier in the 1976 primary elections. Ask the students to act out one of the following:

   a. a visitor from a banana republic
   b. a visitor from the Soviet Union
   c. a native of India
   d. a moslem from Libya
   e. a recent immigrant from New Boreno
   f. a visitor from planet XY 143
   g. an aborgine from outback Australia

   Students are to become one of the above. Then they are to view how Americans select their leaders. Students are to react to this in any manner and with respect as to how leaders in a,b,c, are selected. All other students are to evaluate reactions of those students who are playing a,b,c, etc. If recent film footage is not available, use earlier convention films.

4. Show the movie Mr. Rhooney Goes to Washington. Ask for a short written review of this film, as to depth, delivery, honesty, and value.

Developmental

1. Give a list of terms and statements that students are to define and evaluate. The following are examples:

   socialism
   anarchy
   fascism
   interest groups
   pluralist society
   conservative
   liberal
   electoral college
   civil liberties
   federalism
   bureaucracy

2. View specific filmstrips and films (to be selected according to availability). Additionally, listen to a few lectures by outside guest speakers who will explain theory and reality in American politics. (Local politicians are usually happy to fulfill this request.)

3. Problem solving: divide class into groups with 4-5 students per group. Students are to select one of the following problem situations and reach a solution for presentation to class.

   a. With this task, your group will brainstorm for 15 minutes to devise new methods of selecting candidates for any political office. Pay special attention to the candidate running for the office of President.

   b. Determine how the Democratic party has alternated on the question of civil rights over the last seven decades.

   c. Determine how the Republican party has changed its position on recognition of Communist nations over the last decade.

d. Explore the issue of conservatism vs liberalism within one party. Pinpoint changes in party philosophy regarding each.

4. Readings - Robert Winter-Burger, The Washington Payoff; David Wise, Democracy Under Pressure; John Ferguson, The American System of Government; Emmett Wright, Jr., Political Leadership In America.

5. Have the class compose a new political party; one that has the philosophy they believe in. Also have students rewrite the Constitution of the United States to include political parties. Ask a provocative question: are political parties really legal within the framework of the constitution.

6. Devise games that illustrate the success and failure of American politics during the last decade: (an example would be Democracy: The Workings of the Legislative Process.)

7. Designate certain students to become heads of various governmental departments. They are to devise a plan of action to show how they would manage their particular department. Have all other students evaluate the results.

8. Use national and local newspapers to obtain a list of editorial support for various candidates.

Culminating

1. Have the entire class convene a mock political party convention of today. They should be authentic and yet original in their attempt. This convention will have one major goal, to show the most absurd events that take place within political conventions.

2. Write a paper entitled "American politics has been...." - include the remainder of the title and in essence review our national political process for the past 100 years.

3. All students are to share their personal feelings as to how our present system operates by discussing such topics as the Watergate Affair, the Wayne Hayes Affair, the Bobby Baker Affair, and other timely topics.

4. Review for unit exam - spend the last few days discussing and reviewing for exam.

Questions for Discussion

1. Have political parties been good for the United States?

2. Do we need a system more like that of Great Britian?

3. Would a multi-party system such as the one in France be better for America?

4. How has corruption changed our political parties?

5. Which is worse, the acts of Richard Nixon or those of Wayne Hayes, et. al.?

6. How can we insure that such acts will not occur again?

7. What are the best characteristics of our political system?

8. Why have recent attempts at congressional reforms had such a rough time?

Evaluation

1. Performance

    a. on preceding activities
    b. participation in class discussion
    c. additional projects not mentioned by instructor but voluntarily undertaken by students
    d. depth and extent of reading

2. Written exam to come at the end of the unit

    a. One copy provided by teacher
    b. One copy to be composed by each student

SKILLS BEING DEVELOPED

C1, A1, etc., refers to the nature and level of the objective as described by Bloom and Krathwohl. C1 is an objective in the cognitive domain at the 1st or knowledge level; A1 is an objective in the affective domain at the 1st or awareness level.

Cognitive:	Affective:
1. Knowledge	1. Receiving
2. Comprehension	2. Responding
3. Application	3. Valuing
4. Analysis	4. Organization
5. Synthesis	5. Characterization
6. Evaluation	

CONTRIBUTED BY

Ben Gunter, Burke County Schools

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May be obtained from Mr. C. Douglas Carter, Winston-Salem/Forsyth County Schools, P. O. Box 2513, Winston-Salem, North Carolina 27102

DEPRESSION SIMULATION

SUBJECT AREA

Social Studies

MATERIALS

Filmstrip "Great Depression: 1929-1939"

OBJECTIVES

Students will understand more thoroughly what it was to experience the Depression by participating in simulations.

DESCRIPTION

These simulation activities may be used in conjunction with a unit on the Depression of the 30's.

ACTIVITIES

The class is divided into pairs and gives a life situation.

Situation #1

You and your partner are living during the depression of the 1930's. One of you has been lucky enough to find a job paying $1.00 per day or $24.00 per month. Your job is to budget your money for living expenses. How much can you afford for rent, food, clothes, utilities, entertainment?

Situation #2

You and your partner are living during the depression of the 1930's. You saved your money in a tin can instead of the bank so you have $500.00 in savings. One of you has also kept your job paying $5.00 per day or $120.00 a month. Budget your money for living expenses. How much can you afford for rent, food, clothes, utilities, entertainment? Will you invest your savings?

Situation #3

You and your partner are living during the depression of the 1930's. You have both lost your jobs and your savings in the crash. How will you live? Keep in mind ideas from the filmstrip. You must have food, a place to live and clothes.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation

CONTRIBUTED BY

Terri Robinett, Northwest High School, Omaha, Nebraska.

LEGAL SQUARES

SUBJECT AREA

Social Studies

MATERIALS

This activity consists of three sets of index cards pertaining to various courts and legal terms. All can be answered by using copies of The Working Law, a small booklet published by the Bar Auxiliary. Each student should have a booklet.

OBJECTIVES

Students will be able to define and have a working knowledge of the court system and legal terms.

DESCRIPTION

This is an excellent way to train "legal experts" in your own class!

ACTIVITIES

Divide the students into three groups. Give each group a set of cards. Each group should select a reporter to record their decisions. If one group finishes before the others, they should use the time to quiz one another as this is a preparatory exercise for the game, "Legal Squares." (You may prefer to use the three sets separately instead of together.)

Set I

1. I want to legally change my name.
2. While working at Joe's Garage, I slipped and fell. My leg was broken and I could not work for six months.
3. Mr. Jones and I decided to open a television repair shop. We signed a contract saying that Mr. Jones and I would both invest $5,000 in the shop. Mr. Jones invested $1,000 and then decided that he wanted to quit.
4. My next door neighbors beat their little girl every time she cried. Sometimes they leave her alone all day without any food.
5. Last month I did not collect the rent due me from my tenant. Now, I would like to evict him.
6. The City Police gave me a citation (summons) for doing 55 m.p.h. in a 35 m.p.h. zone.
7. I have been indicted by the Grand Jury for assault with a deadly weapon.
8. Hank Smith went to St. Louis and picked up ten stolen cars. He brought them to Memphis and sold them to unknowing citizens.

9. My aunt died and left two wills. One will left all of her property to me. The other will gave everything to my cousin.
10. One of my customers has refused to pay $300 for a stereo which he purchased from my shop.

Set II

1. This body is made up of 13 persons who are selected from voter registration files and tax roles. Their names are drawn at random.
2. Money put up to guarantee that the accused will appear for trial.
3. Lying under oath.
4. The public officer who acts as the lawyer for the government in prosecuting criminal cases.
5. A court paper commanding a witness to give testimony in court.
6. Decision of a jury.
7. Request for a review by a higher court.
8. Crime where punishment is a penitentiary sentence. (Murder and burglary)
9. A crime less serious than a felony and punishable by fine or imprisonment in some jail other than a penitentiary.
10. One who testifies as to what he has seen, heard, or observed.
11. Lawsuit between private parties.
12. Any child up to the age of 18; or until 21 if the youth is a Ward of the Court.

Set III

1. Jurisdiction in this court is limited to violations of city ordinance carrying fines not more than $50.
2. The court for minor offenders in both the city and the county.
3. One of the primary functions of this court is to administer the settlement of wills and to protect the interests of widows and minors.
4. Judges for this court are appointed by the President of the Unted States and approved by the Senate.
5. All cases tried in this court have a jury present unless the defendant requests that the jury be waived.
6. This court is also known as the "small claims court" since jurisdiction covers claims in amounts of less than $3,000.
7. This court hears cases involving enforcement of contracts and fairness of contracts. It also handles some adoptions and divorces.
8. The highest court in the state court system. Cases originate in Criminal, Circuit, or Chancery courts and were granted appeals.
9. This court handles cases involving personal injuries, property damages, libel and slander suits, divorces, and adoptions.
10. Cases heard by this court include violations of Federal laws, disputes involving U.S. citizenship, and disputes between citizens of different states.
11. Judges in this court are known as chancellors. They are elected to the bench.
12. This court has five members; a Chief Justice and four associates are elected every six years in a statewide election.

Legal Squares Game: The game is modeled after the television program, "Hollywood Squres." The students like to select their own personalities. Use nine students as guest stars, two as contestants, one or two research experts, one or two scorekeepers, etc. Compose questions from the previous activities.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application.

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RIGHTS OF JUVENILES BEFORE THE LAW

SUBJECT AREA

Social Studies

MATERIALS

Documents of American History, Commager, Henry S., Appleton Century Crofts, New York, New York (no date available).

The Pursuit of Justice, Bragdon and Pittenger, Macmillan Co., New York, New York (the teachers' edition is especially useful) (no date available).

OBJECTIVES

Students will become familiar with their rights as juveniles.

DESCRIPTION

This is an outline of a unit which is centered around the study of the famous Supreme Court case of In Re Gault 1967, which many authorities feel helped to bring about a revolution in students' rights.

ACTIVITIES

I. Historical background
II. General Procedures of Juvenile Courts
III. The case background of In Re Gault
    Each student reads the details of the case.
IV. Procedural Guarantees that Adults Have
    A. The right to counsel
    B. Trial by jury
    C. Written statement of charges
    D. Ability to confront and cross examine witnesses
    E. Stenographic records of the hearings in the judge's chambers
V. Due Process
    Should minors be entitled to due process?
VI. The Decisions Handed Down by the Students in the Class
    These are turned in to the teacher and they are read to the class
VII. Summary of the Supreme Court of the United States Decision
    A. Majority opinion
    B. Minority opinion
VIII. The Nature of Due process That Students Have Before the Law
    A. The right to a formal and timely notice of charges
    B. The right to counsel
    C. The privilege against self-incrimination
    D. The right to confront and examine witnesses (In this case, the right of the Gaults to compel a witness to be in court and question her about the telephone call on which the prosecution was based.)

IX. Questions for Discussion
  - A. Did the decision of the Supreme Court destroy the usefulness of the juvenile court system?
  - B. Would publicity about delinquents deter misconduct?
  - C. Should juvenile proceedings be closed to the public?
  - D. Should there be teenage juries which would make recommendations to judges on the appropriate punishment for specific cases?
  - E. Should employers have access to knowledge concerning delinquency records of job applicants?
  - F. What responsibilities go with the rights under due process?

X. Projects
  - A. Interview a probation officer or juvenile judge.
  - B. Read the accounts of the Supreme Court case as reported in the local and other newspapers.
  - C. Interview the chairman of the local juvenile conference.
  - D. Interview a policeman on the rights of juveniles before the law.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application, synthesis, evaluation.

CONTRIBUTED BY

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INNOCENT UNTIL PROVEN GUILTY

SUBJECT AREA

Social Studies

OBJECTIVES

Students will:

1. Become familiar with some of the city's ordinances.
2. Be able to practice finding the legal issues in a civil conflict.

DESCRIPTION

Students should use a copy of the city ordinances in order to locate the legal questions involved in the following cases.

ACTIVITIES

Students are to work in small groups as lawyers. They are to decide if their client is guilty or not guilty and to use the Code to decide where they would probably look to determine their client's guilt or innocence. Discuss their verdicts in a large group. If possible, read the statute as written in the Code.

1. Mr. Clyde Stance, age 38, lives two miles from his place of business. In an attempt to conserve energy, Mr. Stance decided to ride his bicycle to and from work each day. On his way to work, Mr. Stance rode by Officer Smith each morning. On the tenth morning, Officer Smith ordered Mr. Stance to stop his bike. He has no license on his bike. Is Mr. Stance guilty of breaking the law?

2. I have been driving for ten years. I have my license to drive. I want to start driving a taxi at night to add money to my family's income. Would I be breaking the law if I installed a meter in my car and started picking up passengers for money?

3. The Farris family built a home in an area that recently was annexed to the city. Now that their home is in the city, the neighbors on the street have all started having sidewalks laid in front of their homes. Mr. Farris prefers the look of the lawn meeting the street with no sidewalks. Mr. Farris refused time and again to lay the sidewalks and told his neighbors he would put boards there instead of a concrete walk. His neighbors grew angry because they felt he should have to do as they had. Who will win the case?

4. An older man who has retired from his job of 25 years decided to help clean up his community. He built a pushcart and began going about from house to house to collect any unsightly junk he could remove for his neighbors. His pushcart was not registered but he only used it up and down a few streets. No complaints were received. In fact, his neighbors appreciated his helpfulness. Is he guilty of a crime?

5. I own a self-service gasoline station and need to open it immediately so I can have an income for my family. There's only one problem. Due to a mixup in shipment, the "No Smoking" signs have not arrived. Would I be guilty of breaking a law without this sign?

6. I am 12 years old and receive an allowance of $1.00 a week. My father told me I could spend my money on anything but candy. One Saturday I disobeyed my father. I went to the store and bought a 15¢ candy bar. Can I be fined or put in jail for doing this?

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application.

CONTRIBUTED BY

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DUE PROCESS

SUBJECT AREA

Social Studies

OBJECTIVES

Students will become familiar with due process and be able to enact a trial situation.

DESCRIPTION

Below is an outline of a unit on due process culminating in the National Citizenship test.

ACTIVITIES

Introduction to due process:

Due process is a term used here to mean the observance of the procedural guarantees embodied in the Bill of Rights to protect a defendant in a criminal trial.

We have learned that fair trials don't just happen. The principles and rules behind them have grown out of hundreds of years of experience. I'm going to issue each one of you some materials entitled "Due Process and the Defendant." The first part tells about the steps we will take in guaranteeing our defendant due process of law. The federal government and most of the states have similar procedures. The second part outlines the roles available from which you will be asked to choose three. Every effort will be made to assign you to one of your choices.

This discussion of due process and the defendant is separated into the parts of a fair hearing and the roles that are available.

Steps in a Fair Hearing:

1. The preliminary examination. Roles: Judge, prosecutor, defense council, witnesses, bailiff, defendant.
2. The grand jury. Roles: Foreman of grand jury, prosecutor, witnesses, grand jurors.
3. The trial. Roles: Judge, prosecutor, defense counsel, witnesses, bailiff, defendant, trial jurors.
4. The appeal. Roles: Counsel, bailiff.
5. The newspaper and murals. Roles: Editors and staff members.

The Roles:

Each student may choose any three roles for this list. Choices should be written down in the order of personal preference. Every effort should be made to honor at least one choice in making the assignments for the trial. The teacher will place those who want to be counsel and witnesses in either the preliminary examination, grand jury hearing, or trial.

Role: Newspaper staff
Purpose: To publish a newspaper about defendant and his trial
Number of students: 4-8
Description: Include front-page headline announcing arrest, news stories about defendant, interviews with counsel, opinion page, letters to the editor, and so on. Use history texts and library books as references.

Role: Mural staff
Purpose: To show pictorially how defendant will be granted due process of law and justice
Number of students: 4-8
Description: Draw scenes to illustrate defendant passing through the various steps of a fair hearing. Add captions to clarify your work. Use the Bill of Rights as a guide. Construct the murals so that they can serve as backdrops for the trial.

Role: Prosecutor (district attorney)
Purpose: To prove defendant's guilt
Number of students: 3
Description: Work with witnesses assigned to you. Help in choosing their historical names and in preparing the testimony. Prepare opening and closing statements for the jury in which you outline and summarize your case. Refer to library and class references.

Role: Defense counsel
Purpose: To disprove case
Number of students: 1-2
Description: Like the district attorney, work with your assigned witnesses in choosing their historical names and in preparing the questions and answers for use as testimony. Prepare opening and closing statements for the jury. Base your work on reference books.

Role: Witnesses
Purpose: To present historical facts under oath
Number of students: 8-14 (assigned to grand jury, preliminary hearing, or trial)
Description: Choose an historical name. Prepare at least 20 questions and answers based on reference books. Relate the questions and answers to proving or disproving the charges against defendant. Review your testimony with counsel to whom you are assigned. Anticipate cross-examination questions that the opposing attorney might ask. These questions and answers will be unrehearsed.

Roles: Grand jury foreman, preliminary hearing judge, trial judge
Purpose: To serve as presiding officers
Number of students: 1-3
Description: Explain the purpose of the activity to the class. Study and follow the procedure sheets that will be issued to you. Take charge of the activity and keep it moving smoothly.

Roles: Appeal court lawyers
Purpose: To argue for or against this topic: Defendant did not receive a fair trial in this school, and a new one should be ordered.
Number of students: 2-6
Description: Assume that defendant has been found guilty. One group of students represents him and attempts to convince a faculty supreme court that due process of law was denied; that is, that the trial was unfair. Another group represents the prosecution and argues that the trial was fair and that the verdict of guilty should stand. Reference materials will be issued.

Procedure:

1. Try to "sell" each role. Student preference should not be the sole criterion for assigning students to activity groups. The teacher's knowledge of a student's general background should also be taken into account, for it is essential that groups be well balanced. Those who are assigned as counsel and witnesses should also be assigned to either the preliminary examination, the grand jury hearing, or the trial.
2. Appoint able, aggressive individuals as counsel, judges, grand jury foremen, newspaper editor in chief, and mural staff chairman. Encourage only the most able to attempt the appeal.
3. The preliminary examination and the appeal may be dropped if the teacher feels that his class is unable to handle them.
4. The minor roles of bailiff and defendant can be assigned to volunteers from the newspaper or mural staffs at the start of the Phase Two preparation. Jurors also might come from these groups. However, a more realistic experience can be achieved by inviting another class to observe the trial and to serve as the grand and trial jurors. Supplementary materials are included that show the class how to choose a trial jury.
5. It may be useful to schedule auditions for the roles of judge and counsel in classes where many students volunteer for these parts. Allow each interested student to give a one-minute talk. Prospective attorneys can try to convince a jury that the defendant is either innocent or guilty. Prospective judges can instruct a trial jury on their duties. The class may rate each speaker on a scale covering excellent, good, fair, and poor. The criteria for evaluation may be interests, persuasiveness, and loudness. The form may be placed on the chalkboard for students to copy on their papers. This activity encourages students to practice listening skills.

Some teachers prefer to have members of the class vote for those whom they wish to have the major speaking roles. This step may be taken after the auditioning has been completed.

Problems Involving the Bill of Rights:

Students should read the chapter entitled "Sixth Amendment" in Your Freedoms: The Bill of Rights and write solutions to problems presented there.

Pretrial Publicity - Can a jury be completely isolated from pretrial publicity?

Confrontation of Accusers - The Bill of Rights guarantees a person accused of a crime the right to confront his accusers.

Additional Activities:

The activities suggested here are presented to bring Phase One of the lesson plans to completion.

A. Scenes from Twelve Angry Men
  1. Interested students volunteer to read scenes. Approximately 15 minutes are needed during each of three class meetings to complete the reading of the play.
  2. Sample discussion questions.
    a. Who do you think made the best juror? Why?
    b. Did the young defendant receive due process? Why or why not?
    c. According to the play, what are some of the strengths and weaknesses of our system?

B. Written and Oral Analyses

Students read and react to selections dealing with the Eighth Amendment concerning reasonable bail and cruel and unusual punishment.

Is putting a student in a pillory or shaving his head constitutionally acceptable? The point at which a sentence becomes cruel and unusual remains open to debate. In an 1889 case, In re Kemmler, the U.S. Supreme Court ruled that "punishments are cruel when they involve torture and a lingering death,... something inhuman and barbarous, something more than the mere extinguishment of life."

It has been ruled that physical suffering is not the only test of cruel punishment. "Shame and humiliation and degradation and mental torture" also fall within the constitutional prohibition (Davis v. Berry).

Some state courts will declare punishments to be cruel and unusual only "when the punishment proposed is so severe and out of proportion to the offense as to shock public sentiment and violate the judgement of reasonable people" (State v. Becker).

Former Supreme Court Justice Arthur Goldberg has written (in Ex parte Wilson) "that as the court stated in 1885, 'what punishments shall be considered as infamous may be affected by the changes of public opinion from one age to another.' In former times, being put in the stocks was not considered as necessarily infamous...but at the present day it might be thought an infamous punishment."

Another quotation worth study is the following:

> "It is reasonable, of course, for a court in setting bail to take account of various factors--the seriousness of the crime; the defendant's economic postion (and)...his past criminal record, if any; and particulary, whether he has ever "jumped bail" in the past. For certain serious offenses, such as murder, bail is simply not available; for others, it is entirely up to the court whether the defendant may be freed at all before trial."

C. Case Study

Students should read assigned selections as follows:

1. Donald Parker, Robert M. O'Neil, and Nicholas Econompouly. Civil Liberties: Case Studies and the Law. Boston: Houghton Mifflin Co., 1965.
2. Liberty Under Law. Edited by Charles Cutler and Craig Pearson. Middletown, Conn.: American Education Pubns., 1966, pp. 27-30.

Some students will be editors assigned to cover the trial for the class newspaper. These students will be free to decide what stories to place in the newspaper and how they are to be written since the Bill of Rights guarantees freedom of the press. But what if the defendant complains that the newspaper made his jury partial and denied him a fair trial? Here we see a conflict between different kinds of rights. Which right takes precedence? Who decides?

A similar case (Rideau v. Louisiana) was tried in Lake Charles, Louisiana, in 1951. On three occasions before the trial below, the defendant Rideau had been shown on television confessing his crime. The trial court refused the defendant's request for a change of venue. On appeal the case reached the U.S. Supreme Court. After we finish reading some of you may act as U.S. Supreme Court justices and others as attorneys in the arguments before the court.

The questions considered by the court were the following:

1. Should Rideau have been freed?
2. Should he have been granted a new trial?
3. Should the court have permitted the death penalty to be carried out?

Nine members of the class should be chosen to play the roles of U. S. Supreme Court justices. One group of students may argue for Rideau, another group for the state. Members of the court vote, giving their reasons. A simple majority is all that is needed to reach a decision.

The conviction below was set aside by the U. S. Supreme Court on the ground that due process had been denied to the defendant. The way was thus made clear for Rideau to be tried again on the same charges but in another community. The majority felt that due process was violated because Rideau had been "convicted" by the news media before his trial was actually held. The minority, however, held that there was no proof that TV had "fatally infected" the trial. It stated, "We cannot guarantee a society free from newspapers. What is important to a fair trial, reasoned the minority of justices, is that newspapers and TV do not cause jurors to make up their minds about a case before they hear all the facts involved."

The members of the class may compare the court's decision with their own. Students should be reminded that a court of appeals usually does not decide whether a defendant "did it." Instead, the court reviews the transcript of the trial below to determine whether it was conducted fairly. If the court finds an error that led to a conviction, it orders a new trial. The teacher may wish to bring out the importance of dissenting opinion. Courts do change their minds; today's dissent may be tomorrow's majority view.

Very few cases ever reach the U. S. Supreme Court. Unless a federal question is involved, the highest court of each state is normally the final arbiter. A federal question is one that touches on the constitutionality of any law, no matter at what level of government the law originates.

D. Citizenship Quiz (Review)

The questions presented here are taken from the National Citizenship Test, presented by CBS News. First, students should read the story very carefully. Then, on a separate piece of paper, they should answer the questions about the rights of the people involved.

National Citizenship Test

The scene is the living room of a private home. The father of the house has just finished breakfast. His twenty-two-year-old son is in his room. The doorbell rings. Policeman: "Good morning, sir. I'm Sergeant Lynch of the Metropolitan Police Department. I'm sorry to tell you that Mr. Miller, who's the manager of the A & W Jewelry Store on Main Street, has reported that your son Bill took some watches from his store. I have a warrant here to search your house for the watches that were stolen last night."

Question 1: At this point Sergeant Lynch must be allowed into the house to search for the watches. True or false?

In the next scene Sergeant Lynch enters young Bill Wilson's room. The officer looks quickly around the room, walks to the bed, and turns the pillow over. He then goes to the desk where Bill is sitting and opens and shuts a drawer rapidly.

Policeman: "You're Bill Wilson, aren't you? I'm Sergeant Lynch of the Metropolitan Police Department. I want you to tell me where you were between 6 and 6:30 last night. Were you downtown?"

Question 2: After he has identified himself to Sergeant Lynch, Bill Wilson must answer any questions he is asked. True or false?

After questioning, Bill Wilson goes to the police station with Sergeant Lynch. Bill is still behind bars 48 hours after his arrest. Wilson (To jailer): "What am I charged with? Why am I being held? I want to get out of here now! Tell me why you are holding me or let me out! What am I charged with?"

Question 3: At this point in our story, Bill Wilson has the right to know the charges against him. True or false?

Bill is on trial for robbery. The judge and jury are listening to the district attorney: "And here's something the defense counsel doesn't know that proves beyond a doubt that Bill Wilson is guilty. I have a signed, sworn statement here from Charles Miller of the A & W Jewelry Store. In this statement Mr. Miller says that he saw the accused, Bill Wilson, come into the store and then rush out with the tray of watches under his coat. Mr. Miller is out of town and can't be reached for a few weeks, but his sworn statement proves to me that Bill Wilson is guilty as charged."
Defense counsel: "Objection!"

Question 4: Mr. Miller's sworn statement, which definitely places Bill Wilson at the scene of the crime, may be introduced as evidence. True or false?

Bill Wilson is found not guilty. A month later the district attorney releases a photograph as new evidence. The photograph clearly shows youn Wilson running away from the jewelry store with the tray of watches under his jacket. The district attorney moves for a new indictment, convinced that he will get a conviction on the same charge this time.

Question 5: Because of the new evidence just revealed, the district attorney may reopen the case on the same charge. True or false?

Answers

Question 1 is true. Sergeant Lynch must be allowed into the house to search for the stolen property. He identifies himself as an officer of the law and presents a search warrant, satisfying the basic requirements of the Fourth Amendment for a search warrant. That is, the search warrant describes the places to be searched and identifies the object of the search.

Question 2 is false. Bill Wilson does not have to answer any of Sergeant Lynch's questions once he has identified himself. The Fifth Amendment to the Constitution provides that no individual shall be required to testify against himself in a criminal case. Since any statements Bill Wilson makes at this time may be used against him later in court, he may not be required to answer Sergeant Lynch's questions.

Question 3 is true. It is a violation of an individual's historic rights to be held for an unreasonable amount of time without being told the charges against him. In this case Bill Wilson may seek a writ of habeas corpus, which requires a court hearing at which he would have to be present. During the court hearing he must be told the charges against him or be released.

Question 4 is false. Article 6 of the Bill of Rights guarantees that the accused will be confronted with the witnesses against him. Unless Mr. Miller appears so that the defense can cross-examine him, his accusations against Bill Wilson will be inadmissible.

Question 5 is false. Since Bill Wilson was found not guilty a month ago, he is protected by the Fifth Amendment to the Constitution, which provides that no person shall be put in jeopardy twice for the same offense--the concept known as "double jeopardy." Thus, a man found innocent of a criminal charge may never again be indicted and tried for the same crime in the same court.

The National Test Sample

The following table shows the breakdown of the national test sample by individual questions. The percent of correct answers to each question is underlined.

Question	Subject	True (In percent)	False
1	Search warrant	87	13
2	Compulsion to answer	20	80
3	Knowledge of charges	93	7
4	Sworn statement	60	40
5	New evidence	35	65

A specially selected cross-section of American citizens has been given the same story and questions. The results of this national test sample have been tabulated. After we correct our work, each of you will be able to compare his answers with those of your classmates and with those of a cross-section of your fellow Americans.

SKILLS BEING DEVELOPED

Analysis, application, evaluation.

CONTRIBUTED BY

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CLASSROOM LEGISLATIVE COMMITTEE

SUBJECT AREA

Social Studies

OBJECTIVES

Students will be able to anticipate potential outcomes of laws they would like to see passed.

DESCRIPTION

Committees in the state or national legislature spend much time comsidering the potential consequences of proposed legislation. Students can profit from developing this skill of anticipating potential outcomes.

ACTIVITIES

1. Students submit in writing suggested changes in existing school, community, state or national laws.
2. Choose a class legislative committee and give the members the responsibility of reviewing several reasonable suggestions.
3. Have the committee list 5-10 major negative potential consequences and the same number of positive potential consequences.
4. On the basis of these deliberations, ask the committee to identify several suggestions which, in their opinion, would result in the most desirable and least desirable consequences.
5. Invite the group to submit these suggestions to the appropriate body for consideration--the student council, city government, state or national legislature.
6. Some students may want to gather data on the degree of increased awareness of potential consequences in the personal decision of committee members.

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation.

CONTRIBUTED BY

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AIRPORT SIMULATION

SUBJECT AREA

Social Studies

MATERIALS

Map of Nebraska; topological map and population man.

OBJECTIVES

To use Bloom's taxonomy and brainstorming for problem solving, in a true-to-life situation. To practice the process of brainstorming.

DESCRIPTION

This activity, where students select a Nebraska location for an international airport, is designed to introduce brainstorming and reinforce Bloom's taxonomy.

ACTIVITIES

1. Boundary Breaker: If you could fly anywhere in the world, where would you go?
2. Encounter Lesson: You are a seat on an airplane:
   - A. Where are you?
   - B. Where have you been?
   - C. Is there anything special about you?
   - D. A fat lady with a crying baby is coming down the aisle toward you--what happens?
   - E. Who would you like to have sit on you?
   - F. If you could benefit mankind in some way, what would you do?
3. Introduce brainstorming. Brainstorm the question "What is Nebraska?" Emphasize that no ideas will be evaluated.
4. Bloom's Taxonomy:
   - Knowledge: Show them the map of Nebraska. Also, give them a population map and show them the topographical map.
   - Comprehension: Let them look at the laminated map and find additional information such as rivers, state roads, etc.
   - Application: The problem: The Federal Government would like to build an international airport somewhere in Nebraska, because it is a centrally located state.
   - Analysis: Where would you build the airport? What are the implications of the information? Who is going to be affected?
   - Synthesis: What are all the possible solutions to the problem?
   - Evaluation: From all the possible solutions, where would be the best location for the airport and why?
   - Note: Brainstorming will be used at the synthesis and analysis levels. Evaluation will be deferred for later.

SKILLS BEING DEVELOPED

Independence, creativity, critical thinking, affective, planning communicating, forecasting, and decision-making

CONTRIBUTED BY

Betty Walker, Jan Rogers, Project ESURG, ESU #2, RFD #1, 2320 North Colorado Avenue, Fremont, Nebraska 68025.

MYSTERY ISLAND

SUBJECT AREA

Social Studies

MATERIALS

Reproductions of maps below.

OBJECTIVES

Students will be able to gather geographic evidence about a place, form hypotheses, review these hypotheses in light of new evidence and refine their notions about the reasons underlying the location of cities.

DESCRIPTION

One of the most effective ways to stimulating inquiry is to use materials that provoke the students' interest. The teacher's role is to encourage the students to form as many hypotheses as possible and to be able to back up these hypotheses with reasons. After the students suggest several ideas, the teacher should begin to move on to higher-order, more abstract questions involving the development of generalizations and evaluations.

Inquiry lessons, such as the "Mystery Island" geography problem, have a special advantage because they can be used with almost any group of students.

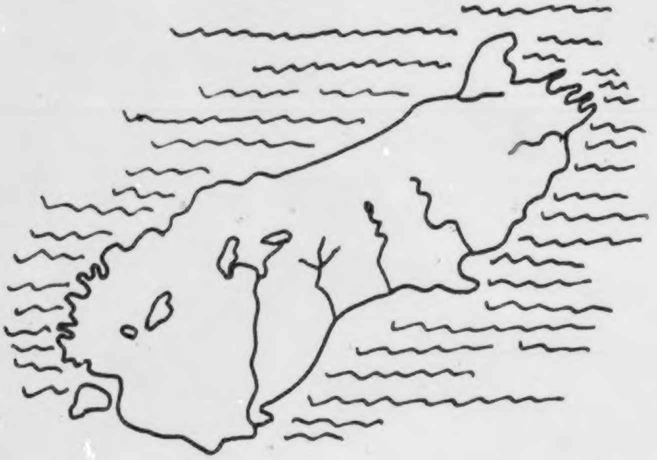
ACTIVITIES

1. The students receive information about the Island in sequence. Map 1 includes data about rivers, lakes, and size (scale). This map is followed by information about landforms (Map 2), vegetation (Map 3), and climate (Map 4). Other data maps, one showing mineral deposits or transportation networks, for example, could be easily added to this series.
2. All students are asked to solve the same problem after getting each new piece of information. The key problem is to locate "the biggest city."
3. After introducing each new element of Mystery Island, the instructor could ask, "Now that you have this information about Mystery Island, what additional information would be most important to you in understanding the Island? Explain why."
4. Other questions could include: "Where would most people live?" "Where would the least number of people live?" and "What would people do for a living on Mystery Island?"
5. All student hypotheses or predictions about the location of cities, population distribution, or the economy of Mystery Island should be backed up with reasons. These hyptheses can then be analyzed, discussed, and evaluated by the class as a whole.

6. In addition to analytical problems concerning Mystery Island, value issues may also be proposed for solution. One such issue could center on the clash that occurs when a technologically advanced culture and a technologically undeveloped culture meet on the island. For example, what would happen if Mystery Island were inhabited by a group of hunters and gatherers and was then invaded by people of a different racial or ethnic origins with superior skills? Students could be asked questions, such as: Should the original population be allowed to mix with the new people? What problems will each group face if they live separately? If they live together? What would be best for all concerned parties? Why?

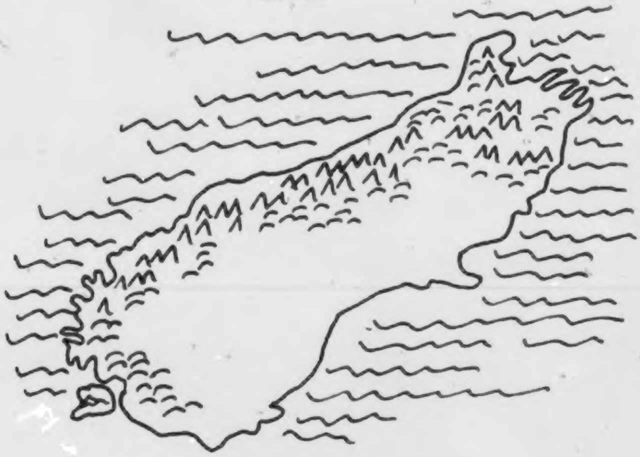
Map 1

Scale: 1 inch = 100 Miles
〰 Stands for sea water
～ Stands for rivers
○ Stands for lakes



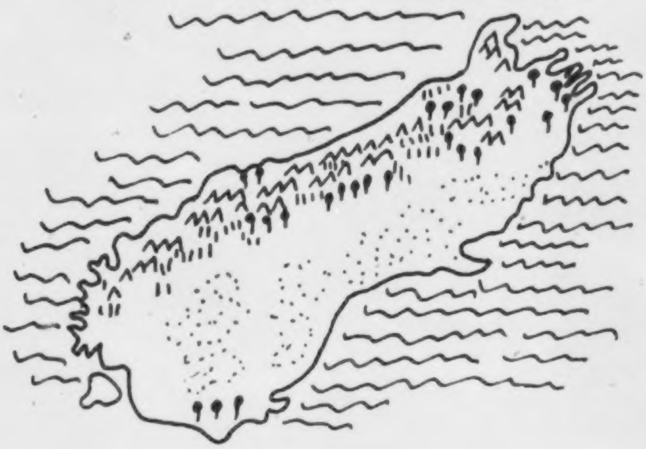
Map 2 Landform Map

ʌʌʌ Stands for mountains and mountainous areas
⌒⌒ Stands for hills and hilly areas
▭ Stands for plains or flat areas

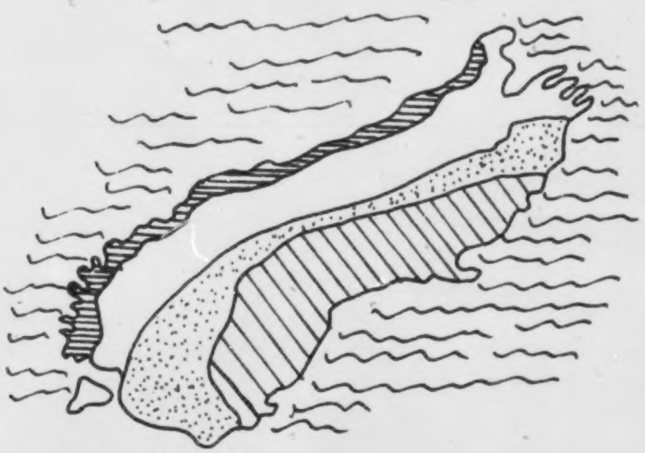


Map 3: Vegetation

░ Stands for grassy areas or grasslands
'''''' Stands for needleleaf trees, such as pine trees
↑↑↑↑ Stands for broadleaf trees, such as oak or maple
^^^^ Stands for mountains and mountainous areas with little or no plant life



Map 4: Rainfall (Average yearly amount)
▧ Stands for areas getting between 20 and 40 inches
░ Stands for areas getting between 40 and 60 inches
☐ Stands for areas getting between 60 and 80 inches
▤ Stands for areas getting more than 100 inches



Temperatures:
Average temperature in July = 32 to 50°F
(In the mountains, average temperature in July = 14 to 32)
Average temperature in January = 50 to 68°F
(In the mountains, average temperature in January = 32 to 50°F)

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application, synthesis, evaluation, receiving, responding, valuing, organizing.

CONTRIBUTED BY

Reprinted with permission from "Mystery Island: A Lesson in Inquiry" by Jack Zwin, University School, University of Michigan from Today's Eduation, NEA, 1201 16th NW, Washington, D. C. 20036.

THE HAPPENING GAME

SUBJECT AREA

Social Studies

MATERIALS

15 "Happening" Cards
15 "Result" Cards

OBJECTIVES

Students will be able to recognize and predict cause and effect relationships for the future. Students will be able to practice persuasion.

DESCRIPTION

Students try to convince the leader that their results have relationships to the happening described by the leader.

ACTIVITIES

1. Introduce card game in the following manner:
    a) The class will be divided into groups of five or six students.
    b) Each group will consist of four-five players and one judge.
    c) The judge will deal "RESULT" cards equally among the players.
    d) The judge will turn over one "HAPPENING" card at a time and read it to the group and then ask, "What will be the result?"
    e) Any player who feels he has a card which gives the possible result of that happening should lay it face up on the table in front of him.
    f) The judge will ask the first player who lays down a "RESULT" card to read it and explain why he chose that card.
    g) If the judge accepts his explanation, the player may leave it on the table, and the judge will read the next "HAPPENING" card. If the judge does not accept the explanation, the player must return the card to his hand and any other player may put down a "RESULT" card and explain why it would be a possible result.
    h) The game ends when one player has played all his "RESULT" cards.
    i) The judge should play the "HAPPENING" cards as many times as is necessary until one player has played all of his "RESULT" cards.

2. Have students get into groups and elect a judge.

3. Play the game.

4. Discussion Follow-up

Have students write their own reactions to the following questions:

a) How did you decide if the card you played was correct?
b) Why was there more than one correct card that could be played for each happening?
c) If the Watergate Affair was a happening, list some of the possible results.
d) If the use of slavery was a happening, list some of the possible results that we can still see today.
e) From this game what do you thihk is the relationship between American history and America today?
f) What is the relationship between America today and America tomorrow?

SKILLS BEING DEVELOPED

Synthesis, application

CONTRIBUTED BY

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TECHNOLOGY
BY CHANCE OR BY PLANNING
(A simulation game adapted from the story
"Gadget vs. Trend" by Christopher Anvil)

SUBJECT AREA

Social Studies

MATERIALS

Letter from Ralph Nader, script for Ralph Nader's Briefing Tape, script for Radio News Broadcast Tape, Time Magazine article, telegram from Ralph Nader, Chicago Daily News article.

OBJECTIVES

Students will be able to make judgements concerning a product of the future. Students will be able to consider different complex aspects of society in evaluating a product's usefulness.

DESCRIPTION

Students form committee to investigate the possible uses of a new device, "The Hughes Quiet Wall." Many factors of society are introduced during the course of their investigation.

ACTIVITIES

1. Have each student read the letter from Ralph Nader and complete the questions at the bottom.
2. Have those who decided to participate in the committee investigation form a circle. (You may need more than one committee)
3. Have those who decided to observe form a circle around the committee.
4. Give the observers the sheet they are to complete.
5. Play Nader's briefing tape and allow students to read the script of the tape as they listen.
6. Students should then be allowed to begin their discussion. (They may fumble around for awhile, but this is all a part of the learning process.)
7. There are four messages which can be delivered to the students at various times. If your students are being extremely creative, you may not want to give them any of the messages until after the committee is finished with their work. If the committee is having a difficult time getting started, perhpas the first message will motivate them. It will be up to you to decide how and when to use each message depending upon the situation.
8. Remember you are Nader's assistant not a teacher. For this simulation to be successful, you must treat your students as an official investigatory committee.
9. After each committee is done with their work, have them discuss the following questions:

SIMULATED LETTER

From the Office of Ralph Nader
311 Connecticut Ave. NW
Washington, D.C. 25503

Dear

As you already know there is a new product on the market which is quickly becoming the hottest selling item since the invention of the Television. The Hughes Quiet Wall Unit is a device which effectively soundproofs any material surface. When plugged in to a simple AC/DC electrical outlet this device sets up a privacy shield around the entire area. (The size of the area depends on the size of the device.)

Millions of Americans, especially those dwelling in large cities, have found the Hughes Quiet Wall device helpful in eliminating the common noises, (TV's, record players, quarrels, crying babies), which seem to be a frustrating part of our present-day crowded living conditions.

A problem with this device, however, has been brought to my attention. A Mr. George Trotter of Springfield, Illinois, reprots that he hired a painter to paint and wallpaper the inside of his home. When the painter had finished, Mr. Trotter paid him in cash and was given a receipt. A few days later, Mr. Trotter noticed that the wallpaper in one of the rooms had started to buckle and peel. He immediately called the painter but to no avail. He continued to call for days but could get no answer. Mr. Trotter then decided to pay the painter a visit. He went to his home but upon reaching the front gate, he hit what seemed to be an invisible wall. The gate would not budge and once more he could not climb over the gate because of this impenetrabel wall. After thorough investigation, Mr. Trotter found that the wall encircled the entire house. Mr. Trotter said he could not be sure but thought he saw someone peering out of the window at him. He returned to the painter's house each day. The invisible shield was always there. Mr. Trotter, now determined to find out what was going on, called the Springfield Times' Action Editor. The editor did not seem to be of much help to Mr. Trotter but he did, after looking into the situation, discover that the painter had recently purchased ten large Hughes Quiet Wall devices. Neighbors said that they saw the painter digging around the fence and burying something underneath it. The action editor then decided to call this office and report his findings. Perhaps these Hughes Quiet Wall devices have more uses than we are aware of.

I am forming a committee to investigate the possible uses of this device and to perhaps make recommendations to the Federal Government on limiting its uses.

Because of your background and experience, you have been recommended to me to participate on this committee. I hope that you will accept this responsibility and respond immediately.

Sincerely,

Ralph Nader

SIMULATED SCRIPT FOR TAPE

MUSIC

We interrupt this program for a special news bulletin:

In a high speed chase, a gang of bank robbers got away this morning with an estimated $1,500,000 in cash and negotiable securities from the New York Securities Exchange Building. The getaway car, which received little if any damage, broke through numerous roadblocks. Sheriff John Younglove told this reporter that bullets would not penetrate the surface of the car. Two sheriffs deputies were seriously wounded in the two hour long chase. Authorities speculate that the car used for the robbery was equipped with a Hughes Quiet Wall Unit.

And now back to KOBL and Rock On with the Music!!!!!

MUSIC

SIMULATED MAGAZINE ARTICLE

NEW USES DISCOVERED FOR HUGHES QUIET WALL UNIT

On Saturday, the General Motors Testing Center in Detroit announced the development of an accident proof car. A test driver in a new model Pinto reached a speed of 50 MPH and then went into a skid on an icy test track. The car turned completely around and rolled four times landing on its side. The Pinto was totally undamaged and the driver rolled out unhurt. A spokesman for GM announced that the car had been equipped with a Hughes Quiet Wall Unit. With the unit turned on, use of a sledgehammer could not even dent the car, the gas cap could not be unscrewed and the hood could not be raised. When the device was turned off, the automobile became perfectly normal again.

The unit used in the test was different from the Standard Hughes Quiet Wall device used to soundproof floors and walls. General Motors announced that they plant to work out an agreement with the Hughes Quiet Wall Corp. so that this discovery would soon be available to the American public.

The Hughes Quiet Wall Corporation, however, refuses to make any comment about the results of the GM test.

A. Does man have any control over technological advancement? Should man have control over technological advancement?

B. If we put limits on technological inventiveness are we limiting our growth or stifling attainment of a higher standard of living?

C. How can we as individuals wisely use our knowledge of history to make the age of the machine a golden age where man can reach the full heights of his capabilities?

D. If you could have had any input into limiting the use of a particular technological invention would you have taken advantage of the opportunity? If so, which inventions? State your reasons for choosing the invention. What would be the beneficial consequences of limiting its use? What would be the harmful consequences? Would you go so far as to ban completely the use of this invention?

E. Have the observers discuss their observations of the committee as they worked through the problem.

SKILLS BEING DEVELOPED

Evaluation, application

CONTRIBUTED BY

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SUBJECT AREA

Social Studies, all

OBJECTIVES

Students will be able to:

1. Research a topic of current interest and report it to the class.
2. Write questions for a poll.
3. Tabulate the results of a poll and report them in an accurate way.

DESCRIPTION

Students interested in keeping up with new developments in research may want to conduct an awareness survey or report current research in the school newspaper to educate members of the student body.

ACTIVITIES

1. By reading current magazines, newspapers and brainstorming, students will come up with a series of questions that are currently being researched and discussed and are of interest to peers. For example:
   What are the facts about the shampoo you use?
   What everyone should know about high blood pressure.
   What are some common misconceptions about physical exercise?
   What effect does processing have on nutritional value of food?
   (An excellent source for these is Consumer Information Center, Pueblo, Colorado 81009)
2. By consulting The Reader's Guide to Periodicals, and the card catalog in a library, students may locate most recent publications on a given topic. They may then compile their data and present in report form being careful to give proper credit to publications.
3. Reports may then be transformed into polls for the student body or informative articles for the student newspaper. A great deal of attention should be given to poll questions to make certain results will be valid and measure what is desired.

SKILLS BEING DEVELOPED

Application

SUBJECT AREA

Social Studies, Science

MATERIALS

Booth or display unit. Charts, maps depicting different aspects of energy saving.

OBJECTIVES

Students shall know facts about energy saving devices well enough to answer questions to the public.

DESCRIPTION

Students can carry out a community service by following up an energy study with information booth.

ACTIVITIES

After a thorough study of the energy problem and its social ramifications, students may follow-up with an informative display or "energy night" at community gathering places or school.

By sending to the Consumer Information Center, Pueblo, Colorado 81009 they may obtain free pamphlets, maps, charts on energy saving. Students may choose which ones to reproduce for display.

Students may also obtain through some communities a photograph of their community which is heat sensitive and illustrates which homes are losing heat from lack of insulation.

SKILLS BEING DEVELOPED

Synthesis, Evaluation

EMOTIONAL SOCIAL STUDIES

SUBJECT AREA

Social Studies, All

OBJECTIVES

1. Given a list of emotions the student will arrange them chronologically as they appear after birth.
2. On request, the student will identify steps that are being taken to promote friendliness around the world.

DESCRIPTION

Feelings have a place in the world too. Study them as a worldwide phenomenon.

ACTIVITIES

1. Using the following list of emotions arrange them chronologically as they appear after birth in the average child.

   affection for adults
   affection for children
   anger
   delight
   disgust
   distress
   elation
   excitement
   fear
   jealousy
   joy

2. Create a plan that you think would help to promote friendship among nations.

3. In a group, decide which plan is best and recommend its use to the class.

SKILLS BEING DEVELOPED

Analysis, evaluation, categorize, create, deside.

CONTRIBUTED BY

Developed in the Omaha Public Schools for the Technical High Magnet School.

MAN AND COLOR

SUBJECT AREA

Social Studies, Art

MATERIALS

Pictures of flags and brief philosophies of the various countries, Book by Syd Hoff, Stanley, Harper & Row, New York.

OBJECTIVES

To afford opportunities for students to question, to wonder and to form tentative relationships between situations through group discussion. Emphasis will be on the role of creativity in man and how color relates to man.

DESCRIPTION

This activity combines the looking at the philosophy of a country and the analysis of color into an excellent exercise.

ACTIVITIES

Encourage students to examine pictures of flags, particularly noting the colors. Conduct a general discussion using the following guiding questions:

1. Can you hypothesize or make a supposition about the philosophy of any one country?
2. Why do you suppose any particular country chose to use certain colors in their flag?
3. What are some of the various ways that man uses color to express himself?
4. Is this also true in the animal world?

After various comments are given, select those that point to the use of color as camouflage and for emphasis.

2. Is there an analogy between what we are saying about the animal world and man?
2. Are there colors that have particular meaning for you?
3. Ones that make you feel a certain way?
4. Let's look at the stated philosophy of the various countries.

Divide students into small groups of three and lead their study by the following questions:

1. How close was your hypothesis using color as a basis of decision?
2. Did the country choose colors to emphasize themselves, for example a small country with little or no army choosing aggressive colors.

Bring students together as a group and discuss their hypotheses and ideas following the analysis of the philosophies.

1. Let's examine other ways creativity can be stifled.
2. Can and are colors used to stifle creativity?
3. What are some of the results of stifling creativity in man; for example someone's work?

Example: A student and a teacher who have been affected by stifling situations and what the outcomes have been. Have you known situations where someone has been changed by a positive creative experience?

Point out that it ends with the creative person bettering the lot of all man.

SKILLS BEING DEVELOPED

Emphasize creativity is not a separate layer in a human being. We are not parfaits, rather we are integrated totalities that learn and function in life better with creative atmospheres and minds.

CONTRIBUTED BY

Unknown.

MAN'S ROLE IN THE COMMUNITY
ACTIVITY II

SUBJECT AREA

Social Studies

MATERIALS

Filmstrips: Automation: Promise or Threat? Guidance Associates of Pleasantville, New York 10570 (1972).

Inventions and Technology That Shaped America, Learning Corporation of America.

Films: Push, Wombat Productions.

The Living Machine, National Film Board of Canada (1963).

Robotics: Isaac Asimov's (Clank! Clank!) Artificial Man (1973) Syracuse Films.

The Thinking Machines, Bell Telephone Laboratories; #791.

But Is This Progress, NBC Educational Enterprises; #0255C1 (1973).

California 2001 A.D., Time-Life Films.

Engine At The Door, (1962) Indiana University; #BS-92.

Man and the "Second" Industrial Revolution, Contemporary/McGraw-Hill Films; #192009-9 (1970).

Island of Dreams: A Fable For Our Times, Texture Films Inc.

Mister Magrooter's Marvelous Machine, BFA.

OBJECTIVES

At the completion of this activity, each student will be able to write an essay discussing 1) the importance of individual action in creating a desirable future and 2) how man can initiate change.

Students will:

1. Make a list of ten past inventions and describe at least five effects each invention has had on our society today.
2. Create a time line showing the chain of events which led us from gathering rocks for security to developing nuclear weapons for security.

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3. Project what will be necessary for security in the future and complete their time line through the year 2000.

4. Discuss how technological invention can get out of hand if man has no control over it.

5. List at least ten ways in which they as individuals can take action on their beliefs about a particular invention or product which they feel may create an undesirable future.

DESCRIPTION

Creating a desirable future world is dependent upon our ability to become responsible decision makers. Students need to be given a chance to discover their own values and to realize that what they do as individuals, no matter how great or small, can have an impact on society.

In the following series of learning experiences, students will explore their role as a community decision-maker through a simulation game entitled, "Technology-By Chance or By Planning?" Students will also be asked to investigate effective ways in which an individual can take a stand on his beliefs. Later on in the program, students will be asked to use these ideas to promote a desired change.

ACTIVITIES

1. Have students learn about the technological inventions and discoveries which shaped America and their impact on modern society.

2. Put the following paragraph on the overhead projector and have students read it.

"Once upon a time there evolved upon this planet an organism that was ill-suited for survival. It could not run fast enough to escape its enemies; if caught, its teeth and claws were small protection. It was too big to hide under a leaf and too weak to burrow deeply into the ground. To survive, it took refuge in caves where a fire at the entrance kept predators at bay. If the fire ran out of fuel, this creature could hurl rocks and thus drive all but the most determined enemies away. Its security was measured by the amount of firewood it could accumulate and the number of rocks it could gather and store in the cave against the terrors of the night." (From Kaiser News)

Ask students:
- A. What is the organism in this paragraph?
- B. What time period does this paragraph refer to?
- C. What was necessary for survival then?
- D. What do you think is necessary for survival now?
- E. How was security measured then? Now?
- F. How and why do you think we progressed from gathering rocks for protection to the development of nuclear weapons?

Have your students create a time line charting the chain of events which led us from gathering rocks for security to developing nuclear weapons for security. Then have students project into the future by deciding what will be necessary for security in the future. Have them complete the time line through the year 2000.

Show the film "Island of Dreams." Use a stop action projector and have the students guess what is to happen next in the chain of events.

3. Have your students play the card game "Cause and Effect: Predicting the Future."

4. Have your students participate in the simulation, "Technology, By Chance or By Planning?" (Adapted from the short story, "Gadget vs Trend" by Christopher Anvil.

5. Have the students investigate the various ways in which an individual can take action to limit the use of a particular technological invention or product. Ask each student to submit at least one idea and make a class journal of all the ideas.

SKILLS BEING DEVELOPED

Application, analysis.

CONTRIBUTED BY

PREparation for the Future, Westside Community Schools, Omaha, Nebraska.

SUBJECT AREA

Social Studies, Art, All

MATERIALS

Camera and film

OBJECTIVES

Students will be able to:

1. Identify prominent markers in their community.
2. Pick out things they feel are important historical markers or artistic accomplishments in their neighborhoods.

DESCRIPTION

Students can develop a sense of community pride by observing historical markers and art work from their neighborhoods. Here's one way to help that happen.

ACTIVITIES

1. By careful observation, it should be possible to gather some slides or pictures of weathervanes, tombstones, cornerstones, etc. which are important for their historical significance or for their artistic accomplishment. Share and discuss these with the class.
2. If possible, take a field trip and gather more similar data. Or have a community scavenger hunt by giving students copies of pictures which they should find and identify in their neighborhood.
3. Have studnets sketch or photograph more on their own for individual projects.

VARIATIONS

Enough data or artwork could be accumulated to warrant an art fair or information booth.

These pictures could be published in the student paper each week with the student who identifies it first winning a prize.

SKILLS BEING DEVELOPED

Knowledge, comprehension, application, synthesis, evaluation.

CONTRIBUTED BY

Melodee Landis, Department of Education, 301 Centennial Mall South, Lincoln, Nebraska 68509.

DECISION TREE

SUBJECT AREA

Social Studies, Language Arts, All

OBJECTIVES

Students will be able to fill in their own decision tree.

DESCRIPTION

Here is a visual way to illustrate and organize the many small decisions that go into any major decision.

ACTIVITIES

The purpose of a decision tree is to call attention to the decision making process and to enable people to figure out the alternatives resulting from a series of decisions. The tree begins with a single decision and traces all the necessary decisions which have to be made-going backward to a beginning point.

In other words, you decide on a goal to be reached. To reach that goal, you have many steps. Each step is a separate decision. The decision tree traces the decisions from the final goal back to the beginning point.

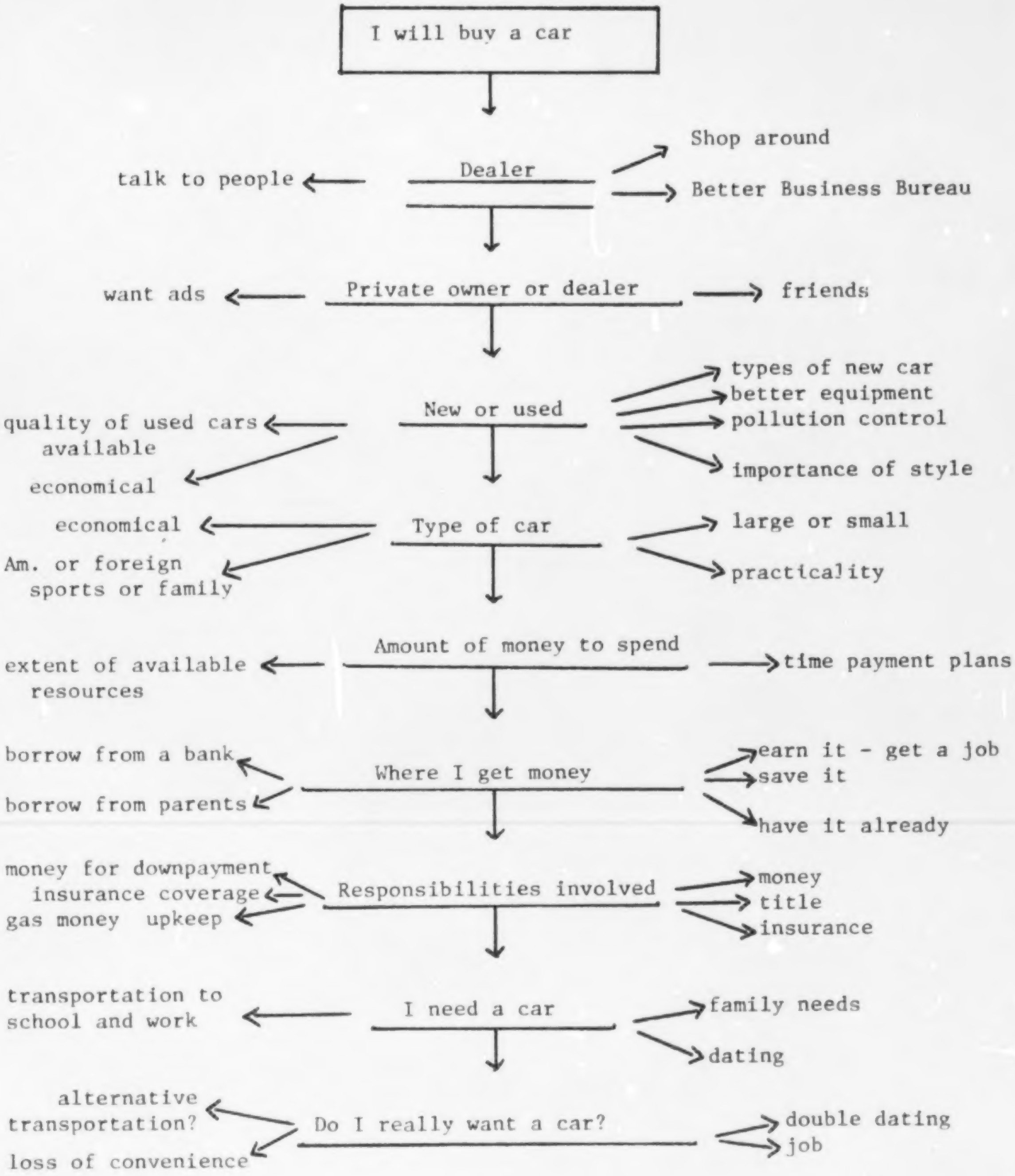
Look at the model on the next page. It starts with the act of buying a car. Go through it carefully, tracing back to the point of the first decision.

To construct a decision tree, begin by stating your goal. Brainstorm with others all the possible steps necessary to reach that goal. Then begin plotting the tree. Start at your goal - the end product. What is the final step to be made toward that goal? Continue working backward toward the present, taking small steps and writing down the decision which must be made at each step. In this way you can see how many decisions need to be made in order to get to a particular goal.

Following the steps described above, and using the decision tree on the next page as an example to follow, construct a decision tree for a Christmas vacation ski trip to Vail. Your starting point will be skiing at Vail. You must work backward through all the steps and decisions which were involved in getting you on the slopes. Remember to take small steps. Some things you need to include are: Transportation arrangements, room arrangements, equipment, money. Do this on a separate sheet of paper.

The purpose of the decision tree is to point out the many small steps (decisions) that are made in order to achieve a final decision or goal. If we know about and understand how events are ordered, perhaps we can figure out when certain trends or negative events can be stopped or reversed or turned to move in another direction. For an example of a future problem that needs to be worked on in the present, consider world hunger. Make a decision that there will be enough food for all people in every nation to eat. Then construct a decision tree to work back through all the small steps necessary to reach this decision.

Decision Tree


I will buy a car
talk to people
Dealer
Shop around
Better Business Bureau
want ads
Private owner or dealer
friends
quality of used cars available
economical
New or used
types of new car
better equipment
pollution control
importance of style
economical
Am. or foreign sports or family
Type of car
large or small
practicality
extent of available resources
Amount of money to spend
time payment plans
borrow from a bank
borrow from parents
Where I get money
earn it - get a job
save it
have it already
money for downpayment
insurance coverage
gas money upkeep
Responsibilities involved
money
title
insurance
transportation to school and work
I need a car
family needs
dating
alternative transportation?
loss of convenience
Do I really want a car?
double dating
job

SKILLS BEING DEVELOPED

Analysis, application

CONTRIBUTED BY

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THE FLIGHT

SUBJECT AREA

Social Studies, Drama, Language Arts

OBJECTIVES

Students will be able to experience physical expression through a problem-solving activity.

DESCRIPTION

Students explore problem solving as well as personal physical expression in order to surmount obstacles an escaping convict might encounter. Excellent warm-up or boundary breaker.

ACTIVITIES

Working with a group of 6-8 active players as well as with a group of participant/observers, designate with chairs or other objects a 20'-30' course. Ask the players to move from one end of the course to the other as quietly as they can. Then ask them to return to the beginning as though they were escaping from prison under the very noses of the guards; "No sounds--but as quickly as you can." Continue to increase the hazards, the difficulties and gradually inject elements of characterization; perhaps one person limps or has to be carried; others cannot see; it's snowing; they are in the Sahara; they are in water three feet deep. Ask the observers for suggestions: new hazards, new situations, new problems to surmount; but remind the observers that they will have to solve the same problems when their turn comes up. Allow time for the "fugitives" to devise solutions, to experiment with the new situations and with their new characterizations and to devise cooperative means for survival. Suggest role changes from time to time; perhaps the leader sprains an ankle or the blind person regains sight. Rotate the player and observer roles and encourage ingenuity but do not criticize stereotyped solutions.

VARIATIONS

Students could write a story after their experience.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation, responding, organizing, characterizing.

CONTRIBUTED BY

Reprinted with permission of Joe McCarthy, from Arts Packet available from Pennsylvania Department of Education, Box 911, Harrisburg, Pennsylvania 17126.

WHAT CAN YOU DO?

SUBJECT AREA

Social Studies

DESCRIPTION

Students are asked to work together to come up with a solution to a problem which could really happen to them.

ACTIVITIES

Read the following excerpt. Try to imagine yourself in such a situation and consider how you would get yourself out of this situation.

"Imagine you are driving a car down a street in a foreign country. All of the people whom you see are of a race different from your own. They also speak a language you cannot understand.

Suddenly a car passes illegally through a stop sign and strikes your car! Both you and the other driver get out of your cars to inspect the damage. You examine your car and find that your front fender is completely destroyed. The other drive is unable to speak your language. However, even though it's clear to you that the other fellow was legally at fault, by his gestures he indicates he's not guilty. In fact, he appears to be demanding that you pay him for minor damage to his bumper. You refuse to comply. He becomes angry and a hostile crowd begins to gather. No police are anywhere in sight. You are completely on your own. What should you do? What can you do? What choices are available to you?"

Helpful Hints:

If students have difficulty getting into this problem, you might help them with the following questions:

1. What are the most important things I want to come out of this, even though I could sacrifice some of these if absolutely necessary?
2. What lines of action are open to me - what are my choices?
3. How do the people I have to deal with see the situation, and what are the different things they believe they need and want?
4. Have I the strength, or the money or the ability to get the support of the local people to back me up in what I wish to do?

Students are free to elaborate on the situation. They may wish to develop a set of circumstances for the characters involved, create a specific location in a specific country, etc. The problem could be given an international tone, by elaborating how the countries of these two drivers might get involved and how the nations might react to one another. (Similar to the way the drivers are reacting?)

SKILLS BEING DEVELOPED

Divergent Thinking; Problem solving; Synthesis

CONTRIBUTED BY

Reprinted by permission from "Teaching for Thinking," Charles E. Merrill Publishing Company, 1300 Alum Creek Drive, Columbus, Ohio 43216.

SUBJECT AREA

Social Studies

MATERIALS

Listed in each lesson.

OBJECTIVES

Students will have a fundamental knowledge of their own thinking processes as evidenced by their ability to carry the Osborne-Parnes Problem-Solving Method to completion on a problem of their own choosing.

DESCRIPTION

The following are some sample lessons pulled from a unit on developing creativity by Cindy Andersen, Holdrege, Nebraska.

ACTIVITIES

SESSION I: "The Future Problem-Solving Method"

Materials Needed: Handouts, Movie "Future Shock," Paper, Pencils.

1. Boundary Breaker: What will be the best thing about Christmas (another Holiday) 100 years in the future?

2. Osborne-Parnes Problem-Solving Method: Handout #1 and explanation.

3. Finding the problems in a MESS: Handout #2: The Third Ice Age

4. Brainstorming solutions to the problem. (Handout #3)

5. Pick out the best solution. (Your best ideas seldom are the first ones you think of.)

6. Homework Assignment: Watch the movie "Future Shock" sometime this week.

Brainstorming Rules

1. Criticism is ruled out.
2. Free-wheeling is welcomed.
3. Quantity is wanted.
4. Combination and improvement are sought.

Handout #1 SOLVING PROBLEMS
(The Osborne-Parnes Problem-Solving Process)

1. Find the problems in a big MESS.
2. Find the most important or the underlying problem.
3. Brainstorm many kinds of solutions.
4. Pick the very best solution.
5. Plan how to use the solution.

Handout #2 THE COMING OF THE THIRD ICE AGE

Scientists back in 1977 noticed a definite shift of weather patterns during the winter months. California experienced some extreme drought conditions instead of their usual rainy season. Snow was scarce in parts of the Midwest and very heavy in the East. While Alaska was experiencing the warmest winter in decades, Georgia and Florida had some of the coldest temperatures in history.

This was the beginning of the Third Ice Age. Now, in 2000 gigantic glaciers cover most of Canada, Alaska, and part of Maine. The average summer temperature in the states of California and Florida is 37°. Winter months are so severe that no one is permitted outside their homes. In addition, huge numbers of homeless immigrants have entered the U.S. when the glaciers crushed their Canadian homes. Predictions are that the ice will cover two-thirds of the United States before it retreats.

Handout #3 RATING SCALE FOR BRAINSTORMING IDEAS

5 = very best 4 = best 3 = next best 2 = poor 1 = poorest	Workable	Safe	Will it last	Beneficial	Money	Total Points
Using Solar Energy	2					
Electric Wires	1					
Seed Clouds	4					
Explode Bomb	5					
Paint	3					

SESSION II

Materials Needed: Handouts, paper, pencil.

1. Boundary Breaker: If school were suddenly called off today for the rest of today and you could do anything you wanted to do, what would it be?
2. Hand out "Thinking Creatively About the Future" (Handout #4)
   -Explain Questions; have group pick one to brainstorm.
3. Brainstorm one question in handout; ask group to individually complete others by next session.
4. Handout "Solving Problems" (Handout #1) Explain that we will learn the entire process in the next four weeks (collect at end of period)
5. Handout the "Mess" for today (Handout #5): "Television Instead of Teachers?"
6. Discuss questions.
7. Brainstorm problems in the "Mess."
8. Pick big problem.

Handout #4

THINKING CREATIVELY ABOUT THE FUTURE

by E. Paul Torrance
Georgia Studies of Creative Behavior
Athens, Georgia
June, 1974

This is an invitation to think creatively about the future! Below you will find three problems based on future predictions. You are to imagine that the prediction has "come true" and to suggest possible alternative solutions. Use your imagination and think in terms of possibilities. Do not wait to weigh the probabilities. Concentrate on producing as many ideas as you can. Do not be afraid to guess. No one can really know, so there are no "wrong" answers.

1. During recent years young people increasingly have rejected the authority of tradition, position, and wealth. It is predicted that this trend will continue. What problems might possibly arise from this development? List as many such problems as you can. Record your problems.

2. The following news flash describes a possible future problem. Imagine it has happened.

   WASHINGTON, D.C.: Last night across the nation apparently well-coordinated attacks on automated machinery took place. The most effective blow occurred in Philadelphia where a group of 500 blue collar workers completely destroyed a computer installation.

   In San Francisco and Los Angeles, in Detroit and New Orleans, police and National Guard arrived in time to prevent destruction of private and government-owned automated machinery and computing machines. The well-known cause of this unrest is the widespread unemployment.

In what ways might this type of unrest be avoided or greatly reduced? Think of as many ways as you can--list them.

3. There is considerable evidence to indicate that criminals are compelled by certain physical stimuli, either internal or external, to perform criminal acts. It is being argued already that criminals should be regarded as sick persons with a disease for which they have to be treated. Already there has been considerable success with treatment methods and evidence is accumulating to indicate that criminal behavior is a brain malfunction which is curable. In what ways might motivation be developed to eliminate criminal punishment by imprisonment for extended periods of time and by the execution of selected criminals and replace it by a system of treating the brain malfunction? List as many ideas of accomplishing this as possible.

Handout #5 NO MORE READING IN SCHOOLS!

Reading tests tell us that today's students read poorly. Teachers and parents are getting upset that their children don't read as many books as they used to. The reason, many say, is television. Today's students can get most information without ever having to pick up a magazine or a book or a newspaper. TV gives us news and movies. Computers can store diagrams and pictures as well as information and then feed back information in a human-like voice. Road signs too are eliminating writing from their messages so that speakers of foreign languages can understand them. It is possible that one day no one will need to read.

In what ways might we encourage the teaching of reading to future students? Give as many solutions as you can.

SESSION III

Materials Needed: Handouts, record player, "ocean" sound effects.

1. Boundary Breaker: In what way might we conserve our decreasing water supply?

2. Handout: "Solving Problems." (Handout #1)
   We have now completed steps #1,#2, and #3. Today we will work on step #4--picking the very best solution.

3. Handout: "Problem-Solving: No Water" (Handout #6)
   Explanation of question and brainstorming results.

4. Handouts: "Rating Scale for Brainstorming Ideas" (Handout #3) and "Will it Work" (Handout #7)

5. Discussion: Picking the questions which measure solution to "No Water" question.

6. Rating the solutions.

7. Tallying results.

8. Homework assignments: "No More Reading" MESS -- through best solution stage.

Handout #6 PROBLEM-SOLVING: NO WATER

In what ways might we conserve our decreasing water supply?

1. Cut off water supplied to recreation areas (like swimming pools) or for decorative displays (like fountains).
2. Ration water per household member.
3. Set up rain catching tanks for every 1,000 people.
4. Prohibit water use for irrigation, lawns and gardens.
5. Raise the rates charged by city water commission.

Handout #7 WILL IT WORK?

How to pick the best idea: 1) First-brainstorm 2) Second-evaluate
(Some examples of yardsticks)

1. Does it prevent waste/conserve materials?
2. Will it bring about desired improvement/change?
3. Will it be acceptable?
4. Will it "explode" people's minds?
5. Is it easy to understand/explain?
6. Is it an improvement over what's presently done?
7. Is it financially possible?
8. Is it workable?
9. Is it only a cover-up of the problem or will it really solve the difficulty?
10. Will it work for only a little while or will it work for a long time?
11. Will it cause as small a disturbance as possible?
12. Is it ethically sound? (Is it fair?)
13. Will it produce results?
14. Is it based on what we know to be true?
15. Will the people who have to do it rebel?
16. Will it take too many people?
17. Is it too general to really do any good?
18. Will it just head the problem off or really solve it?
19. Are there people around with enough brians to do it?
20. Will it keep on working?
21. Will it cause more problems than it solves?

SESSION IV: "Selling the Idea"

Materials Needed: Handouts, paper, pencil

1. Boundary Breaker: When do you worry the most about what other people think of you?

2. Handout: Cartoon of people in line--fill in captions and discuss questions.

3. Handout: Completed Rating Scale from last week's session on conserving water.

   Imagine that these cartoon character people are standing in line to hear your solution to the water shortage. How would you "sell" your solution to them? What would you say? Would you advertise or pass laws or hire people to talk in schools or what? List ten ways you would get your solution across to people:

4. Now make a presentation about your solution that is like you would really do it if it were really to happen.

SESSION V: "Putting it all together"

Materials Needed: Handouts, paper, pencil.

This session needs to be one hour and twenty minutes in length. Students will go through an entire problem-solving experience. Many such problems are available by writing for "Handbook for Future Problem-Solving" (address below).

SKILLS BEING DEVELOPED

Application, synthesis, evaluation

CONTRIBUTED BY

Cindy Anderson, ESU #11, P.O. Box 485, Holdrege, Nebraska 68949.

Some materials were reprinted from "Handbook for Training Future Problem Solving Teams" by E. Paul Torrance, Sandra Williams and J. Pansy Torrance.

Available from Program in the Education of Gifted and Talented Students, Department of Ed. Psych., University of Georgia, Athens, Georgia 30602.

ORAL HISTORY

SUBJECT AREA

Social Studies

MATERIALS

Hirsch, Ruth and Lewinger, Miriam. "Oral History: The Family is the Curriculum." Teacher Magazine, November, 1975.

McCormack, Alan J. "Digging for Roots: A Learning Bonanza." Learning Magazine, August/September, 1977.

Shumway, Gary L. An Oral History Primer. Copyright 1973. California State University at Fullerton.

Wigginton, Eliot. The Foxfire Book. New York: Anchor Press/Doubleday, 1972. Done by high school students in Appalachia.

Wood, Pamela. The Salt Book. New York: Anchor Press/Doubleday, 1977. Done by high school students.

OBJECTIVES

Students will be able to plan and carry out an interview.

Students will be able to gather information and report it to the class.

Students will be able to discuss and share information thus gaining information from several life histories.

DESCRIPTION

By involving students in a project on oral history (the tape recording of the rememberances of an individual's life experiences), they can develop a number of inter-personal skills while learning about history. Here is how Centralia School District in Buena Park, California conducted theirs.

ACTIVITIES

Outline of Communications:

Communication...an essential part of this project. These steps help insure proper communication between interviewer and interviewee.

1. Introductory letter or meeting with parents explaining objectives and outline of unit.
2. Consent to interview and permission to record from interviewee.

3. Approval of rough draft before final copy from interviewee.

*4. Permission to utilize booklets as an educational aid from interviewee.

*5. An open house honoring interviewee including family and loved ones.

*Optional

Outline of Student Activities:

The students will be involved in a project on oral history, the tape recording of the remembrance of an individual's life experiences.

With tape recorders and questions in hand, the students will go forth to conduct interviews with their subjects. The subject may be a parent, relative, or family friend. When the interview has been completed, each student will write a book based on the autobiographical material he or she has obtained. There are three phases to our oral history project.

I. Preparation

A. Students have made the initial and very difficult decision in selecting the person they will interview.
B. They have listened to and discussed excerpts from interviews conducted by other students.
C. Students have listed, as a group, categories which are of interest to them (homes, toys, schools, inventions of the past, etc.)
D. From the category list each student has selected eight categories of special interest on which to base his or her interview.
E. Interview questions have been written on an individual basis for each category of special interest.
F. Students have studied interview techniques.
G. Map skills have been reviewed so students may accurately record places of importance in their subject's life.
H. Many have undertaken "extra" projects which they will share with their classmates at the culmination of our project.

II. The Interview

A. When students have completed preparation, they will schedule and conduct their interviews.
B. The interview may be conducted in one or two sessions, depending on the proximity of interviewer and subject.
C. In cases of great distance, interviews may be conducted by letter. Some students plan to include a blank tape so that relatives may orally answer their written questions.

III. Transcription

A. Students will bring their completed interviews back to class where they may share portions of them with their classmates.

B. Students will transcribe the tapes or summarize the interview into a book others will enjoy reading.

C. After the first drafts have been written, proofread, and approved by their subject, the students will carefully hand-copy or type the final version.

D. Students will make a cloth-covered binding for their final copy.

E. Our class will hold an open house at the culmination of our project to honor our subjects and to share the work that their lives have inspired.

We hope to learn many things from this project. Although we have listed many of our educational goals, there are others of equal importance... the student's awareness of his or her connection with the preceding generations; the perception of history as a personal experience and not just an accumulation of dates and facts; the understanding of the manner in which historical events may shape or affect a person's life; and an appreciation of the various cultures and backgrounds that have contributed to the development of our country.

Possible Categories:

Childhood (games played; events remembered)
Toys (what kinds, what made of, compare to todays)
Schooling (how long, what kind of school, discipline, elementary/college, etc.)
Dates (what did you do, where did you go, etc.)
Sports (participation, favorite teams or sports)
Clothing (style of dress, cost of clothes, amount of clothing)
Travel (method, distance, place)
Transportation (horse, foot, trolley, train, plane, etc.)
Clubs and Organizations (Lyons, Rotary, etc.)
Food (American, foreign, how changed)
Holidays (traditions - American or foreign)
Culture (pertaining to interviewer: e.g. Chinese, Spanish, etc.)
Occupation (TV, sports, dancer, pilot, armed services, doctor, teacher, etc.)
Medical Care (home visits, costs, cures, common diseases, etc.)
Money (money scarce, plentiful, how far could money go?)
Utilities (electric, candle, wood or gas stove, phone, etc.)
Working Conditions (hours, wages, unions, contracts, etc.)
Inventions (TV, jet flight, electric typewriters, computers, radar, electric mixer, vacuum cleaner, etc.)
Entertainment (music, TV, dancing, reading, etc.)
Housing (brick, weather suited, country, city, etc.)
Depression (1930's) (standard of living, money, food)
World War II (soldier in, reaction to, experiences)
Korean War (soldier in, reaction to, experiences)
Viet Nam War (soldier in, reaction to, experiences)
Assassination of Kennedy, etc. (reaction, records, etc.)
First Manned Flight to the Moon (reaction to, witness of)

Preparing for the Interview:

Project Steps:

Step 1. Prepare for the interview through class discussion, research, and planning.

Step 2. The subject. Students must determine: person to be interviewed, age and birthdate of subject, relationship to you, why you chose this person, where does this person live, how will you conduct this interview? (tape, notes, letter), second choice if interviewee of first choice is unavailable.

Step 3. The interview.

A. Interview Techniques - start from early part of subject's life and work to the present. This information will be recorded on tape and/or noted on the provided worksheets.

B. Make a list of possible categories on your worksheet (example: childhood, toys, education, holidays, etc. - see attached suggestion sheet) You must have at least eight categories and three or four questions from each category. At the end of each category, ask if there are any comments the interviewee would like to add.

C. Star those categories on suggestion sheet which are of particular interest to you. Add categories you might like to cover.

D. Remember

1. All rough copies must be approved by teacher before they may be typed, inked or drawn.
2. Some subjects may not wish to answer some categories or questions. Check some alternatives just in case and review questions briefly before taping or noting.
3. Try to take good care of your folder - if you lose materials or are not neat - you will waste valuable time. Your subject and you will have a beautiful family heirloom to be passed down from generation to generation. TAKE CARE!

Centers:

After students complete their projects, they can set up centers for others in class to study. These centers depict aspects of the interview and can include calligraphy, collage, mobiles, models of America's past, diorama, bookbinding, maps, bulletin boards, or transcription using headsets.

VARIATIONS

A. Extra maps of family, relatives, business travels, vacations, etc.

B. Recipe for "Melting Pot."

C. Family tree - geneology.

D. Family crest or shield - you may design your own if your family does not already have one or you cannot find it.

E. Astrological forecast (depends upon guest speaker)

F. "How to" -

G. Collage

H. Diorama

I. Models of America's past

J. Poster

K. Insignia

SKILLS BEING DEVELOPED

Too numerous to list.

CONTRIBUTED BY

Marty Sexton and Karen Takeno, Centralia School District, 6625 La Palma Avenue, Buena Park, California 90620.

TIJUANA BRASS

SUBJECT AREA

Social Studies, Music

OBJECTIVES

Students will be able to analyze three pieces of music and place them in societal context.

DESCRIPTION

Students can become involved in the study of history by analyzing the climate of the society during which a song was popular. This lesson juxtaposes Handel, Berlioz and the Tijuana Brass to exaggerate social changes.

ACTIVITIES

Teacher-selected
Directed focus

The works used in the lesson include:

1. A Tijuana Brass selection (What Now My Love)
2. A composition by a full Symphony orchestra: Berlioz, Symphonie Fantastique.
3. Handel, Concerto Grosso in C Major for Oboes, Strings, and Continuo.

The following questions were asked of the students before hearing all three of the above recordings:

1. What instruments do you hear in the full orchestra which are not in the two smaller groups?
2. What instrument or instruments do you hear in the two smaller groups which are not heard in the full orchestra?
3. Which group sounds as though it may date itself earliest in history? Which the latest?
4. Which of the three groups might employ a director during performance? Why?
5. Which of these three groups might bear the closest visual resemblance? Why? (Number of players, informal seating, no conductor.)
6. Which group or groups would you say has a rhythm section working continuously?
7. Which of these groups would be the most constraining to the participating musician? Why?
8. Which would give the most freedom? Why?

After students responded to these questions, the selections were played again to help verify and clarify some responses. The recordings were played again and the following questions asked:

1. Why were small groups of the 10 piece Baroque orchestra size popular during this period?
2. Why are small groups like the Tijuana Brass so much in favor in our popular field today in contrast to the big bands of Stan Kenton and Woody Herman?
3. For years Baroque music has not had a large listening audience. Recently it has had resurgence. Why? What has been a large contributing factor? (Social Context)
4. Do you have any physical reaction as you listen to each of the three pieces?
5. Which piece makes you feel the most relaxed? The most agitated? Etc.
6. How many different ideas or themes are stated in each piece? Can we draw a pattern of each, such as AABA: AABB, etc.?

The three selections were listened to again without discussion so that the students had an opportunity to put back into the listening experience those things which they had discovered previously.

SKILLS BEING DEVELOPED

Teacher-selected, directed focus.

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CROSS IMPACT MATRIX

SUBJECT AREA

Social Studies, Language Arts, Science

OBJECTIVES

Students will be able to understand impact of different aspects of society by developing cross index matrixes.

DESCRIPTION

The cross impact matrix (method) is a way of attempting to determine the impact that a number of known forces will have on each other.

ACTIVITIES

The simplest type of matrix uses a table on which a number of related forces are listed vertically along the left side. The same forces are listed along the bottom edge horizontally. Then each intersection is analyzed to determine the potential impact of one force on the other. The figure below shows a matrix of this type. Study it carefully. Listed horizontally and vertically are some characteristics of an automobile. If we move vertically from top to bottom along the row labelled "speed," we can begin to analyze the impact of each of the other characteristics on the speed of the automobile. This analysis, then, could be used to help in the design (or purchase) of a future automobile.

The Cross Impact Matrix is valuable in helping us to understand the relationship one trend has to another. A trend is an influence on human behavior that noticeably increases or decreases over time. It must be existent in some form in the past and present, and reasonably expected to continue into the foreseeable future. Population increase is an example of a trend.

Now create your own cross impact matrix dealing with trends that you see developing today in our world which could lead to serious problems in the future, such as world food shortages. Include at least five trends in your matrix.

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation.

CONTRIBUTED BY

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See next page for figure.

CROSS IMPACT MATRIX

	Speed	Ease in Driving	Body Size	Comfort	Engine Size	Cost
Speed	X	X	X	X	X	X
Ease in Driving	Less Control at high speed	X	X	X	X	X
Body Size	Harder to bring a large car to a halt (power brakes needed)	Larger car harder to maneuver and park etc.	X	X	X	X
Comfort	Minor impact	Easier to drive more comfort	Larger car more luxuries for less	X	X	X
Engine Size	Larger engines are able to produce greater speeds	Minor impact	Larger the body larger engine needed	Larger the engine more stability	X	X
Cost	Greater speeds burn more gas	Higher cost power brakes etc.	Larger car more expensive	More luxuries higher cost	Larger engine higher price	X

WILLIAMS' GEMS

SUBJECT AREA

Social Studies

DESCRIPTION

Below are a few ideas for activities from Frank Willimas' Classroom Ideas for Encouraging Thinking and Feeling, D.O.K. Publishers (full information below). Each specifies which element of creativity is being developed-first its cognitive component, then its affective component. Teaching strategies are also specified.

ACTIVITIES

To Encourage: Fluent thinking and imagination
Using: Strategies No. 2 - Attributes
No. 6 - Examples of change
No. 14- Evaluate situations

For a lesson on ecology this teacher wanted to involve pupils in both convergent and divergent thinking. First the differences, with examples, between these two types of thinking were discussed. Convergent thinking results when you think of a single, appropriate answer; while divergent thinking results when many alternatives are considered without caring if they are the most suitable. As an example of convergency, pupils were asked to list all of the known surface features they could think of that are common to all continents (recall). As an example of divergency, they were asked to think of all reasons they could of how these surface features affect population, climate, transportation, natural resources, and plant life. They to further encourage divergent thinking the question was asked, "If you were a native of Uganda imagine how your life would change if you woke up one morning to find mountains had replaced the jungle?" Pupils learned differences between two kinds of thinking and enjoyed the divergent kind more.

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To Encourage: Imagination: Curiosity and complexity
Using: Strategies: Numbered below as lesson unit proceeds

Upon introducing a unit on South America, the teacher wanted to develop cognitive skills (knowledge, facts and information) by affective (interest, attitudes and motivation) means. This teacher felt it was more important to turn children on, to excite them to be willing to learn, before expecting them to delve into the depth and breadth of a topic. Thus, these provocative questions were posed for the purpose of causing children to wonder, be inquisitive, and then to want to explore this topic further:

How do you account for the fact that although South America was settled many years before the United States it has not become more advanced?

People who live in the Torrid Zone are not always hot, why?
How have earthquakes in South America been blessings in disguise?
How can volcanoes do good?
The Indians of South America had one of the earliest civilizations; why aren't they more advanced?

After generating interest in this lesson by asking children to make guesses about these questions, the class divided into twelve groups. The following twelve strategies were used across each of these groups; employing one strategy per group. Each child was to research and investigate the subtopics of the group (strategies) he had chosen. The following twelve strategies were used:

Using Strategy No. 2 - Attributes
What else could be done with nitrates?
Could anything else be made from cacao?
What are the qualities of climate in South America which influence its most important natural resources?

Using Strategy No. 3 - Analogies
Compare habits of finches on Galapagos island with man's tool-making.
Compare culture, climate, land forms, etc., of South America with that of the United States.

Using Strategy No. 4 - Discrepancies
Why are the Andes Mountains higher and less eroded than the Rocky Mountains?
Since South America was settled earlier, how come it is not more advanced than the United States?

Using Strategy No. 5 - Provocative questions
What might have happened if the Incas had defeated the Spaniards?
What if the English had settled South America instead of the Spaniards?
What might have happened if the Amazon River did not flow through South America?

Using Strategy No. 6 - Examples of change
How has the way of life of the Indians been changed by colonizers?
How have the jungle regions along the Amazon changed?

Using Strategy No. 7 - Examples of habit
How are farming methods the same in some places now as they were when the Spaniards first came to South America?
Why do you think some Indians live much the same today as they did 400 years ago?

Using Strategy No. 8 - Organized random search
If you were the head of the Pan American Union, what would you do to unify South America?
If you were a member of the Peace Corps what would you do to help South America progress?

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Using Strategy No. 11 - Intuitive expression

What sights and sounds can you imagine Bolivar experienced in his march over the Andes?

What emotions (feelings) would you imagine you would have experienced if you had been one of the Incas at the time of Pizarro's conquest?

Using Strategy No. 12 - Adjustment to development

How could the skill the Incas had in building their temples be used to advantage today?

How did the Incas learn about astronomy and medicine?

Using Strategy No. 13 - Study creative people and process

How did personal and social discomfort and maladjustment lead to the building of the new capital Brasilia?

How did nitrate processing in Chile come about?

Using Strategy No. 14 - Evaluate situations

Predict what South America might be like if a new system of transportation were developed that would surmount all their present problems of travel.

If you were chosen as a member of a committee on education in South America what consequences would result if you chose to educate all of the people in that country between the ages of 5 to 18?

Using Strategy No. 18 - Visualization skill

If you were a footprint on the soil of South America, what two tales could you tell about this country?

Visualize your tales by drawing pictures of them.

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To Encourage: Flexible thinking and curiosity
Using: Strategies No. 2 - Attributes
No. 8 - Organized random search
No. 14- Evaluate situations

This class requested an opportunity to discuss the creative problem-solving process. The teacher posed this very simple problem and asked the class to think about the ways in which they might go about approaching it. The problem was: What would happen if all of the lights in the room suddenly went off-----what would you do? The class made a list of the kinds of things they would do and set up several steps which were used to solve the problem. Then the teacher posed another problem: "Suppose we were on an island and we were told that tomorrow an immense tidal wave was coming that would completely cover the island forever, what would you do?" Again a list of things to do was made and steps of solving this problem resulted. As the class analyzed the two lists of steps of problem-solving they discovered differences between solving the first problem by habit and solving the second problem which required invention, a new design, and a variety of different approaches. They discovered that the processes of making guesses, trying something new and unusual, and exploring and checking their guesses to see if the problem was solved, all related to creative problem solving in approaches to school problems, home problems, and personal problems.

****

To Encourage: Fluent Thinking and complexity
Using: Strategies No. 1 - Paradoxes
No. 9 - Skills of search
No. 10- Tolerance for ambiguity

In studying the history of man from caveman through modern times, the class deduced that the more civilized man becomes the more dependent he likewise becomes on his fellow man. For example, they learned that the caveman was self sufficient but as he became civilized he began to specialize more and more, making himself dependent on others for many of his needs. The teacher asked the class to search for as many other examples as possible to confirm this paradox. The whole concept of interrelatedness was discovered, and situations revealing how dependent individuals or groups become upon one another were discussed.

****

To Encourage: Fluent thinking; imagination and risk taking
Using: Strategies No. 1 - Paradoxes
No. 6 - Examples of change
No. 12- Adjustment to development

In order to expose children to thinking about way-out situations, the teacher discussed this paradox about contemporary man: How is it that through the isolation of the gene man may now be able to control mutations and thus permit him to improve the human species; yet by drugs, pollution, radiation, and fall-out, man continues to destroy himself. Think of all the alternatives that man has available to him if he can control his own heredity and self-destruction. By imagining this is possible list all of the things you would like man to become.

SKILLS BEING DEVELOPED

Below is a list of Frank Williams' teaching model:

PUPIL BEHAVIORS

Cognitive	Affective
Fluent thinking	Curiosity (Willingness)
Flexible thinking	Risk Taking (Courage)
Original thinking	Complexity (Challenge)
Elaborative thinking	Imagination (Intuition)

TEACHER BEHAVIORS

Paradoxes
Attributes
Analogoes
Discrepancies
Provocative Questions
Examples of Change
Examples of Habit
Organized Random Search
Skills of Search
Tolerance for Ambiguity
Intuitive Expression
Adjustment to Development
Study Creative People & Process
Evaluate Situations
Creative Reading Skill
Creative Listening Skill
Creative Writing Skill
Visualization Skill

CONTRIBUTED BY

Reprinted with permission of D.O.K. Publishers Inc., 71 Radcliffe Road, Buffalo, New York 14214. From Classroom Ideas for Encouraging Thinking and Feeling (1970, $7.50) - Frank E. Williams.

> Behold, the fool saith, "Put not all thine eggs in the one basket"—which is but a manner of saying, "Scatter your money and your attention"; but the wise man saith, "Put all your eggs in the one basket and—WATCH THAT BASKET!"
>
> Mark Twain, *Pudd'nhead Wilson*

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Math Activities

OPERATIONAL SYSTEMS

SUBJECT AREA

Math

OBJECTIVES

Students will be able to understand properties beyond basic operations.

DESCRIPTION

Too often the properties of mathematical systems are considered only as they relate to numbers and the four basic operations (addition, subtraction, multiplication and division). To fully understand these properties a gifted student will display understanding beyond the basic operations. Following are several probelms concerning these properties.

ACTIVITIES

1. Operation: An operation * on S is an assignment which assigns to every ordered pair (x,y) of elements x,y in S exactly one element of S.
2. Operational System: A set S of objects together with an operation * on S is called an operational system and denoted by $(S,*)$. (Closure Property).
3. An operational system $(S,*)$ is called commutative if and only if for all x,y in S, $x * y = y * x$.
4. An operational system $(S,*)$ is called associative if and only if for all x,y in S, $x * (y * z) = (x * y) * z$.
5. Let $(S,*)$ be an operational system. An element n in S is called a neutral element of $(S.*)$ if and only if for all elements x in S, $x * n = n * x = x$.
6. An operational system $(S,*)$ is called invertible if and only if it has a neutral element n and every element x in S is invertible in $(S,*)$, that is, for each x in S, there exists y in S such that $x * y = y * x = n$.

Operational Systems:

1. Draw a picture of a circle on a piece of paper and mark four points on it at about the same distance from each other. Imagine a very small person standing on one of the marks. This person can move around the picture to any mark either in a clockwise or counterclockwise direction, i.e., he can make the following four kinds of moves: stand still, clockwise one mark, counterclockwise one mark or halfway around. We now add another move that allows the person to turn upside-down. That is, if he is standing on his feet, he turns and stands on his head. If he is standing on his head, he turns and stands on his feet. The (upside-down) turn can be

combined with the clockwise, counterclockwise, and halfway around moves. Thus, there are now the following moves (see Figure 1). Stand still (S), clockwise one mark (C), counterclockwise one mark (A), halfway around (H), turn (T), turn and go clockwise one mark (TC), turn and go counterclockwise one mark (TA), and turn and go halfway around (TH).

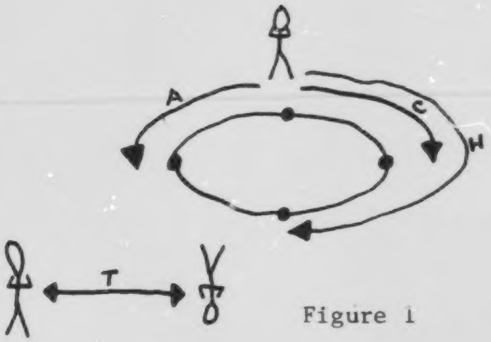


Figure 1

So there are a total of 8 moves. We will use the symbol "♡" to denote the combination of one of these moves followed by another.

For example "C ♡ H" will mean do move C and then move H. If a person makes these two moves, he would be in the same position as he would by making move A only. So, we agree that C♡H = A. Here are some more examples: H♡H = S, TC♡A = T, TH♡TA = C.

Complete the following table for ♡. (Answers are in lower-case letters.)

♡	S	C	A	H	T	TC	TA	TH
S	s	c	a	h	t	tc	ta	th
C	c	h	s	A	tc	th	t	ta
A	a	s	h	c	ta	t	th	tc
H	h	a	c	S	th	ta	tc	t
T	t	tc	ta	th	s	c	a	h
TC	tc	th	T	ta	c	h	s	a
TA	ta	t	th	tc	a	s	h	c
TH	th	ta	tc	t	h	a	C	s

2. Suppose you have a peg board with six pegs on it as shown in Figure 2 below. You could stretch rubber bands from a peg in the top row to a peg in the bottom row in many ways. For example in Figure 3 three rubber bands have been used to make a pattern.

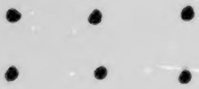


Figure 2

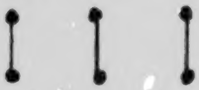
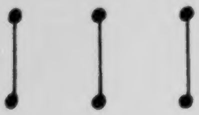


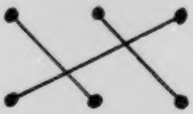
Figure 3

There are many patterns that one could make, but here we shall consider only the following:

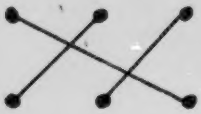
(H)



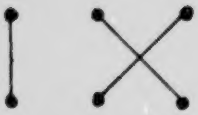
(I)



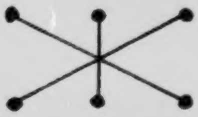
(J)



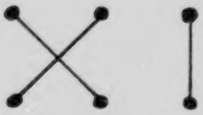
(K)



(L)



(M)



With just three rubber bands and three rows of 3 pegs one could first make pattern H and then make pattern I as shown in Figure 4.

If the middle row of pegs is removed, the pattern would look like Figure 5 and would have the same pattern as I.

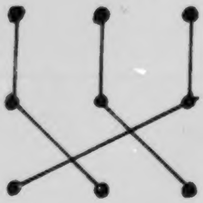


Figure 4

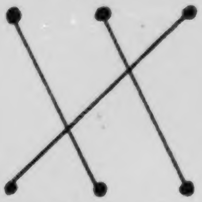


Figure 5

By using this procedure we define an "operation" on the set of six patterns (H, I, J, K, L, M). This operation is denoted by "⊛" (read "star"). By "J ⊛ L" we mean the pattern formed by first making pattern J and then making pattern L and then removing the second row of pegs (Figure 6).

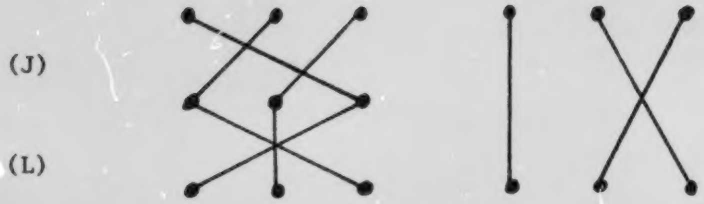
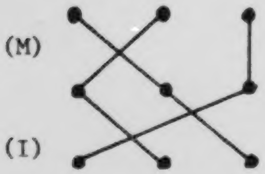
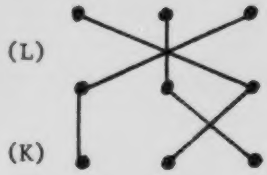


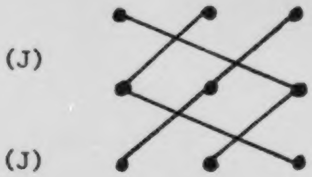
Figure 6

Notice that the pattern in Figure 6 is the same pattern as K. So we agree that J $\otimes$ L = K.

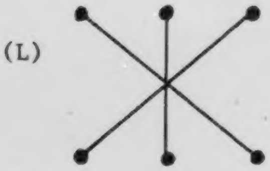
Now look at the following:

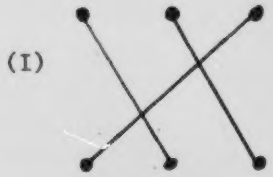


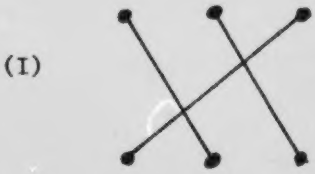




By removing the second row of pegs from each of the above patterns one obtains:







SKILLS BEING DEVELOPED

Application, synthesis.

CONTRIBUTED BY

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CONIC SECTIONS

SUBJECT AREA

Math

MATERIALS

1. String, tacks, and pencil (Activity - Introductory 1)
2. Waxpaper (Activity - Introductory 3)
3. Graph paper and compass (Activity - Introductory 2)
4. Models (Activity - Introduction 4)
5. Tapes, workbooks, and library resources (Activities - Culminating 1 and 2)
6. String, nails, plywood, hammer, compass, ruler, etc. (Activity - Culminating 4)

Bibliographic Material

1. Basic Algebra Tapes. Columbus, Ohio: Merrill Publishing Company

2. Brown, Richard G. and Robbins, David P. Advanced Mathematics - An Introductory Course. New York: Houghton Mifflin, 1975

3. Clack, Alice A. and Leitch, Carol H. Amusements Developing Algebra Skills Volume II. Michigan: Midwest Publication, 1975

4. Jacob, Harold R. Mathematics A Human Endeavor. California: Freeman, 1971

5. Johnson, Donovan A. Curves in Space. Atlanta: Webster Publishing Company, 1963

6. Sobel, Max A. and Maletsky, Evan M. Teaching Mathematics: A Sourcebook of Aids, Activities, and Strategies. New Jersey: Prentice - Hall, Inc., 1975

7. Steen, Frederick H. and Ballou, Donald H. Analytic Geometry. New York: Ginn and Company, 1963

OBJECTIVES

1. The student will be able to define each of the conic sections. (C 1, 2; A1, 2)

2. The student will be able to differentiate between the vocabularies associated with each conic section. (C1, 2; A 1-4)

3. The student will be able to transform a given equation of a conic section into standard form. (C 1-3, A 1-4)

4. The student will be able to identify the basic components of a given second-degree equation. (C 1-5, A 1-4)

5. The student will be able to draw the graph of a given conic section given its equation. (C 1-3, A 1-3)

6. The student will be able to write the equation of a conic section given certain conditions the curve must satisfy. (C 1-6, A 1-5)

7. The student will be able to solve systems of quadratics both algebraically and graphically. (C 1-3, A 1-4)

8. The student will be able to identify present and future uses of the conics. (C 1-6, A 1-2)

9. The student will be able to solve verbal problems involving the application of conics. (C 1-6, A 1-4)

10. The student will be able to create an original design and describe each conic used. (C 1-6, A 1-4)

DESCRIPTION

The world we live in is made of curves and the most important curves in mathematics are the set of conic sections. The early Greeks studied the conics because they were beautiful and interesting; however, practical applications were not discovered until centuries later.

When a second-degree equation is graphed, the resulting figure may be a circle, parabola, ellipse, or a hyperbola. Each of these curves is called a conic section since the curves may be obtained by cutting a right circular cone by a plane.

Astronomy, engineering, physics, and art are a few of the areas to which conic sections may be applied. The study of conic sections is especially beneficial to gifted and talented students since the conics are an integral part of calculus.

Pre-requisites for the study of conic sections are algebra and geometry with emphasis on the distance formula, the coordinate system, completing the square, and loci.

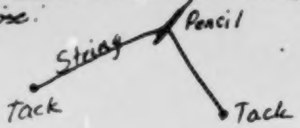
ACTIVITIES

Introductory

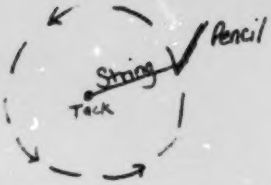
1. After recalling previous work with loci, have the students make constructions

of certain conics using tacks and string.

Ellipse:



Circle:



2. Ask the students to construct the parabola, ellipse, and hyperbola using concentric circles and parallel lines. (See next page from Teaching Mathematics - listed in Bibliography)

3. Have the students construct conics using paperfolding. (Refer to page 140, Teaching Mathematics - listed in Bibliography)

4. Using a disectible model, ask a student to demonstrate how a plane and a cone intersect to form the conics.

Developmental

1. Ask the students to write a precise definition for each conic section based on observations from activities 1 and 2. Then let students compare their definitions and select the most accurate.

2. Request that the students write standard algebraic descriptions for each conic.
   Example: Circle

3. Assign second-degree equations to the students and instruct them to identify the specific conic, write in standard form, identify the basic components, and graph.

4. For stated conditions, have the students write the equation of the conic satisfying those conditions.

5. Assign systems of second-degree equations and allow the students to find the solution set by graphic and algebraic methods.

Culminating

1. Assign verbal problems illustrating applications of the conics. Have the students research and record ways that the conics are used now or might be used in the future.

2. Divide the class into four groups, assign a conic section to each group, and request research of the historical development. Final reports are presented to the class.

3. Have the students do role playing using the conics.
   Example: I am a circle; I can be . . . . (an earring, zero, etc.)

4. Ask each student to create an original design using each conic section at least once. Have the student turn in a description or list of the general conics used in the design.

5. If students have access to a computer terminal, ask them to use appropriate computer generated problems or program a problem on conic sections.

Enrichment

1. Creative designs (See activity-culminating 4.)
2. Creative writings (Similar to Flatland - perhaps called "Conicland")
3. Computer problems (See activity-culminating 5.)
4. Puzzles (See Amusements in Developing Algebra Skills - listed in Bibliography)
5. Bulletin board displays
6. Cassette tapes and workbooks (Supplementary work for independent study)
7. Give several equations containing an xy - term. Ask the student to graph and determine how the xy - term affects the graph.

Questions for Discussion

1. There is a whispering gallery in the Capitol Building in Washington, D. C. The ceiling of this room is a curved surface, formed by rotating an ellipse about one of its axes. If a person stands at one spot in this large room and whispers very softly, someone standing at a certain spot many yards away can hear him clearly. What are these two points with respect to the ellipse

2. When watching a football game on TV, have you ever wondered how you can hear the quarterback's signals over the noise of the crowd? (A parabolic reflector makes this possible. The reflector is pointed at the quarterback, and his voice is reflected to a microphone at the focus of the reflector.)

3. The shockwave of a supersonic jet traveling parallel to the ground is in the shape of a cone trailing the jet. All points located on the intersection of this cone and the ground will receive a sonic boom at the same time. This intersection will be what kind of conic section?

4. The largest oven in the world produces heat by focusing sunlight by means of a parabolic mirror arrangement. It is located in the Pyrenees Mountains in France, took 10 years to build, and cost $2,000.000. The reflector, anchored to the side of a large building, is eight stories high and is about half the area of a football field. It consists of 8,570 mirrors arranged in the shape of a parabolic surface. The oven has produced temperatures of more than $6,000^{\circ}$F. How does this work? Where is the oven?

5. Eccentricity is defined for the student ($e = c/a$), and the following four cases are given:
    1. $e \ 1$
    2. $e = 1$
    3. $e \ 1$
    4. $e = 0$

Have the students analyze these possibilities and indicate the conic section for which each one is applicable.

6. Encourage the students to experiment and determine how a plane can intersect a cone and obtain two intersecting lines or one line.

Evaluation

The evaluation will be based upon the following:

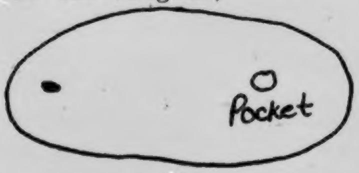
1. Unit Test
2. Short quizzes
3. Homework - classwork assignments
4. Differentiated assignments (See section E)
5. Comprehensive problems

Example: Let's try some "trick shots" in elliptipool. The pool table has the shape of an ellipse and has only one pocket. Where is the pocket located? (At one focus.) What happens if you put a ball at the other focus and hit it without aiming in any particular direction? (It will go into the pocket.) Instead of starting the ball at the focus, suppose you hit it from some other place on the table so that it goes through the focus. What do you think would happen? (It will still go into the pocket.)

If the ball is originally hit so that it travels between the foci, it will continue to do so until it stops. (Illustrate this on the figure.)

If it is hit so that it does not travel between the foci, it will never pass between them. (Illustrate.)

If the length of the major axis of the pool table is 7 feet and the length of the minor axis is 3 feet, how far is the pocket from the center of the pool table? What is the algebraic equation describing the table? (Use the center of the table as the origin.)



SKILLS BEING DEVELOPED

*C1, A1, etc., refers to the nature and level of the objectives as described by Bloom and Krathwohl. C1 is an objective in the cognitive domain at the 1st or knowledge level; A1 is an objective in the affective domain at the 1st or awareness level.

Cognitive:
1. Knowledge
2. Comprehension
3. Application

Affective:
1. Receiving
2. Responding
3. Valuing

4. Analysis
5. Synthesis
6. Evaluation

4. Organization
5. Characterization

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COMPLEX NUMBER SYSTEM

SUBJECT AREA

Math

MATERIALS

Bell, E. T. *Men of Mathematics*. New York: Simon and Schuster, 1965.

Broome, Elizabeth, editor. *Educating for the Future: 21st Century Teaching*. Raleigh, N.C.: Dept. of Public Instruction, 1975.

Hogben, Lancelot. *Mathematics for the Millions* New York: W.W. Norton and Co., Inc., 1968.

Johnson, Richard E. *Algebra and Trigonometry*. Menlo Park, Calif: Addison-Wesley, 1971.

Kane, Robert B. *Algebra and Trigonometry*. New York: American Book Comapny, 1971.

Newman, James R. *The World of Mathematics, Volume I*. New York: Simon and Schuster, 1956.

*Nichols, Eugene. *Holt Algebra 2 with Trigonometry*. New York: Holt, Rinehart, and Winston, 1974.

Scott, J. F. *A History of Mathematics*. New York: Harper and Row, 1975.

*Sorgenfrey, Robert. *Modern Algebra and Trigonometry*, Book 2. Boston: Houghton Mifflin Company, 1973.

Spreckelmeyer, Richard. *The Complex Numbers*. Boston: D. C. Health and Company, 1960.

*Student and Teacher Texts

OBJECTIVES

Students will:

1. Recognize need for imaginary numbers. (1,a,c)*
2. Define imaginary numbers (1,b)
3. Perform operations using imaginary numbers. (3,4,b,d)
4. Define complex numbers. (2,3,a)
5. Devise four operations using complex numbers. (3,4,5,d,e)

6. Transfer properties of real system to complex system. (4,5,6,d,e)

7. Organize concepts of complex system. (i.e., closure, commutative, associative, identity, inverse properties of addition and multiplication, distributive property, etc.)

8. Consider the usefulness of complex numbers in solving quadratic equations. (4,5,6,c,d,e)

9. Write quadratic equation from two complex roots. (1-6, a-e)

10. Compare graph of real numbers with complex numbers. (1-6, a-e)

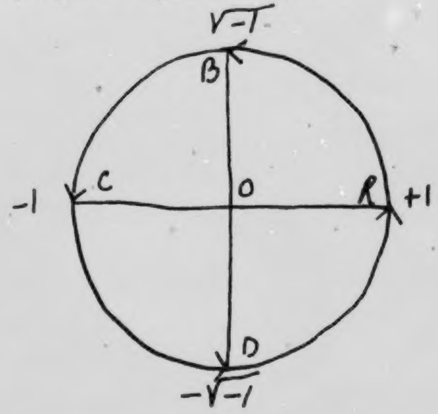
DESCRIPTION

Through participation in classroom activities students will be introduced to the complex number system and will be challenged to define operations and to observe properties of the real number system that are valid in the complex number system. This knowledge of complex numbers is mandatory for all Algebra II students for additional study of quadratic and trigonometric functions; however, this particular unit is designed primarily for the gifted and talented with emphasis on inquiry, organization and evaluation of this mathematical field.

Students have completed a study of the real number system and have used the inquiry approach.

ACTIVITIES

1. Given the equations $x^2 + 1 = 0$, students seek solution. Teacher and students develop imaginary number. One suggested approach is the graphic representation.



In rotating 180°, OA changes in value from +1 to -1.
When OA rotates through 90° (to OB), its value must be multiplied by some factor ---------X.

OB = 1 (x)
OB = x
Then OC = 1 (x) (x)
OC = x^2
OC = -1
Since $x^2 = -1$
Then x = -1, the imaginary unit

2. Given a set of imaginary numbers, students perform the four binary operations and classify results.

3. Students accept formal definition of complex numbers. Through interrogation they determine that operations are needed to form mathematical field.

4. Students form groups to identify definitions of four binary operations with both concrete and abstract complex numbers. Students report definitions to class for evaluation. (Speak to me in algebra)

5. Students are assigned set of exercises from text to simplify and perform operations using complex numbers. Reinforce by playing mathematical bingo.

6. Given the set of complex numbers, students brainstorm with properties or theorems of real number system that might apply to complex system. (i.e., Closure, commutative, associative, distributive, identities, inverses, etc.)

7. Students group to write these properties in rule form. More advanced students prove a theorem to present to class.

8. Students detect fallacy in the following statements.

a.

$$\begin{aligned} \text{Since, } \sqrt{x} \cdot \sqrt{y} &= \sqrt{xy} \\ \text{it follows that, } \sqrt{-1} \cdot \sqrt{-1} &= \sqrt{(-1)(-1)} \\ \text{thus, } (\sqrt{-1})^2 &= \sqrt{1} \\ \text{and } -1 &= 1 \end{aligned}$$

b. If order exists in real number system, then it exists in complex system.

c. The graph of $2x + 3y = 7$, $x, y \in C$, is a line.

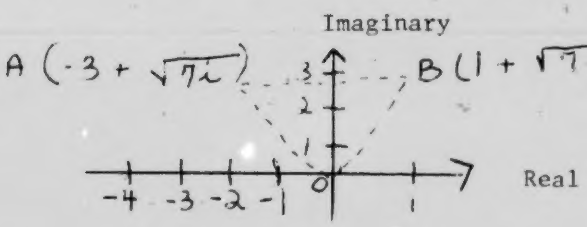
d. The only solution to the following problem is $(4,2)$, $(-2,2)$. Two men left a certain place and walked, each in a straight line, to their destinations which were 4 miles apart. If the distance which one of them walked was one-half the square of the distance which the other man walked, how far did each man walk?

(1) $\left.\begin{aligned} y - x &= 4 \\ y &= \tfrac{1}{2} x^2 \end{aligned}\right\}$ yields real numbers

(when men walk on same straight line)

(2) $\left.\begin{aligned} y - x &= 4 \\ x &= \tfrac{1}{2} y^2 \end{aligned}\right\}$ yields complex numbers

(when not on a straight line



Students demonstrate conclusion to class.

9. Students are assigned exercises from text to review for short quiz on computation and theory of complex system.

10. With student participation, teacher reviews solving quadratic equations by extracting square root, factoring, completing square, and quadratic formula on overhead. (Use real coefficients.)

11. As classwork and homework students solve quadratic equations using all methods. (Use real coefficients.)

12. Students compare answers from previous assignment and classify nature of roots.

13. Students draw a complex number from that to use in formation of quadratic equation with real coefficients. Student produces the other root.

Enrichment

1. Students interview electrical engineer to find practical application of imaginary numbers.

2. Students transfer $\underline{a + bi}$ to $\underline{x + vi}$ and graph complex numbers on complex plane.

3. Students research history of imaginary and complex numbers and write short essay.

4. Students create a complex number puzzle using vocabulary.

5. Students evaluate $(i)^i$ or $(\sqrt{\sqrt{-1}})$.

6. Students present a research paper on a number system of which the complex system is a subset.

7. Write a computer program for solving quadratic equations.

8. If a computer terminal is available, students participate in programs designed for complex numbers.

9. Situation Problem:

   Mrs. Newcomb had rearranged her living room furniture, but was unsure about the placement of a large round table. Her husband was a bit absentminded and occasionally wandered through the house in the dark. She wanted to place the table so that he could walk from the door at one corner of the room to the diagonally opposite corner without bumping into it. She had put the table, which was 4 feet in diameter, in the corner to the left of the door. Its center was 3 feet from the 15-foot wall and 5 feet from the 9-foot wall. Could she safely leave the table there?

10. Encounter Lesson:

"Mission: Number System" - Situation: A planet has just been discovered which has an intelligent life form. You have just returned from a visit to the planet and are part of a committee selected by the Federation of Earth Government to aid the new planet in intelligent growth. Your mission is to help them develop a number system that will facilitate their intellectual growth and achievement.

Method: Students should devise a number system and some of its properties that would enable the new-found beings to develop so they could merge into the intelligent life community.

Purpose: It is hoped that the students will see the reasons why our number system developed and will try to help these beings develop a system of their own instead of forcing our system on them.

Questions for Discussion

1. Is there a number that will satisfy $x^2 = -1$? (5,8)*
2. Does order exist in the complex number system? Prove your answer. (3,4,7)
3. How could we possibly graph the imaginary number? (6)
4. How many properties of the real number system can you name that might apply to the complex system? (1)
5. Is it possible to find three roots of the equation $x^3 = 8$? (2,4)
6. If a quadratic equations has two roots, how many could you expect in a cubic or higher degree equation? (2,4)
7. How can you relate the absolute value of a real number with the absolute value of a complex number? (4)
8. How many complex numbers have the same absolute value? Explain your answer using examples. (6,8)

*Key to Williams Model of Thinking-Feeling Behavior

Cognitive:
1. Fluent thinking
2. Flexible thinking
3. Original thinking
4. Elaborative thinking

Affective:
5. Curiosity
6. Risk Taking
7. Complexity
8. Imagination

Evaluation

1. Short quizzes
2. Class evaluation of definitions and proofs
3. Cross number puzzles and codes
4. Student evaluation of homework
5. Unit test

SKILLS BEING DEVELOPED

*1,a,c refers to the nature and level of the objective as described by Bloom.

Cognitive:
1. Knowledge
2. Comprehension
3. Application
4. Analysis
5. Synthesis

Affective:
a. Receiving
b. Responding
c. Valuing
d. Organization
e. Characterization by a value

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ERASTOTHENES DID IT

SUBJECT AREA: Math

DESCRIPTION: Challenge students to figure out the circumference of the Earth as Erastothenes did.

OBJECTIVES: Students will be able to devise a method to compute the circumference of the Earth.
Students will be able to understand the difference between model computations and actual circumference.

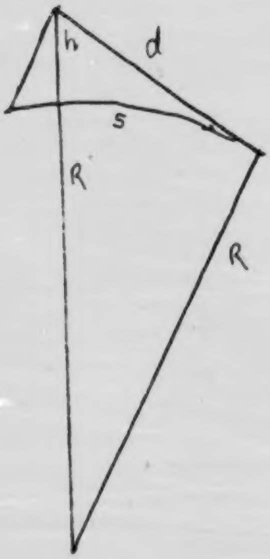
ACTIVITIES

TEACHER QUESTIONS OR DIRECTIONS	STRATEGIES	STUDENT ACTIVITIES	STRATEGIES
1. Students study Greek culture during Classical era, partly to learn math discoveries by Euclid, Pythagoras, Eras.	Organized Random Search	Prepare written or oral reports on research.	Elaboration
2. In 250 B.C. Erastothenes figured out circumference of Earth by measuring the angles of shadows in Egypt.	Skills of search, Provocative Question	Students must reconstruct how he did this.	Flexibility
3. Students think of as many other ways as they can to determine the circumference of the Earth.	Organized Random Search	Students compare various solutions of group.	Fluency
4. Students make model of "best" method available to the Greeks in 250 B.C.	Evaluate Situations, Exam. of change	Students compute circumference using models.	Originality
5. Students are asked to explain difference between model computations and actual circumference.	Paradox, Evaluate Situations	Discussion.	Curiosity, Fluency
6. Lead students in discussion: "How could we insure better accuracy, less error?"	Provocative Question, Examples of Change	Study of elements of error analysis, then determine which models are most "reliable."	Elaboration, Complexity

l

ONE POSSIBLE SOLUTION

pyramid



$$2R = \frac{d^2}{h} - h$$

$$C = 2\pi R = \pi\left(\frac{d^2}{h} - h\right)$$

$$(R + h)^2 = R^2 + d^2$$

$$R^2 + 2Rh + h^2 = R^2 + d^2$$

$$2Rh = d^2 - h^2$$

$$2R = \frac{d^2}{h} - h$$

Assume $s \approx d$

$$C = \pi\left(\frac{s^2}{h} - h\right)$$

If Egypt was used, it could be due to its desert flatness and its large measureable objects (e.g. pyramids).

Let h = height of pyramid (assume 300 feet)
s = distance you walk across the desert so that you see only the tip of the pyramid on the horizon line (assume 22 miles). S also becomes the arc of the circumference of the earth.
d = actual distance of your line of vision (use the Pythagorean theorem to compute).
R = the distance to the center of the earth.
C = the circumference of the earth.

Actually, any flat area in the world could be used. One variation might be the area on the equator. You figure it out!

SKILLS BEING DEVELOPED

Student and teacher strategies are from Frank Williams' Model for Developing Productive-Divergent Thinking.

CONTRIBUTED BY

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HOW MATHEMATICS MAY MEAN SURVIVAL

SUBJECT AREA: Math, Science

OBJECTIVES: Students will be able to arrive at procedure for calculating distances in space.

DESCRIPTION: Use the inquiry method with students for them to discover relationships in outer space.

ACTIVITIES

TEACHER QUESTIONS OR DIRECTIONS	STRATEGIES	STUDENT ACTIVITIES	STRATEGIES
1. How did man arrive at the correct calculations to successfully probe Mars and put man on the moon? Discuss.	Provocative Question	Write to major companies who produced space vehicles specifications for space probes with regard to all phases of production.	Complexity
2. Using the Inquiry Method, respond to the following five problems.	Organized Random Search	. Measure the distance from Earth to the newly discovered galaxy forming in space. . Determine the atmosphere of the new galaxy. . Calculate how to get there and what type of space transport would suffice. . Speculate as to its present length of existence. . Give possible reasons why it is just now being discovered and observed on Earth.	Complexity
3. Arrange for discussions or presentations by astronauts and/or executives from companies producing space equipment.	Discrepancies	Visit NASA or similar space launch site and/or visit observatory to discuss topic of the new galaxy from an astronomer's viewpoint. (If no direct tour available, go via film, tapes, phones, etc.)	Curiosity
4. Courage and Survival, are they related?	Provocative Question	Discuss Courage and Survival from examples in experience, through reading, etc.	Curiosity

SKILLS BEING DEVELOPED

Student and teacher strategies are from Frank Williams' Model for Developing Productive-Divergent Thinking.

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FIGURATIVE NUMBERS

SUBJECT AREA

Math

OBJECTIVES

Students will practice transforming mathematic geometric principles into an algebraic formula.

DESCRIPTION

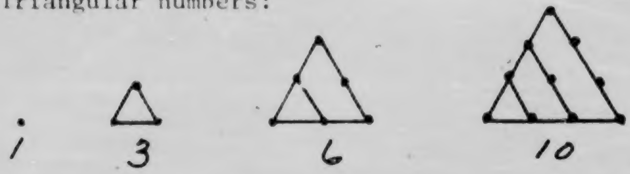
Not all historians agree that Pythagorus personally developed all the number theorems credited to him. But there is clear evidence that he *did* develop figurative numbers. These numbers, considered as the number of dots in certain geometric configurations, form the perfect link between geometry and algebra.

ACTIVITIES

Many interesting theorems about figurative numbers exist. Show both geometrically and algebraically that the following three theorems are true:

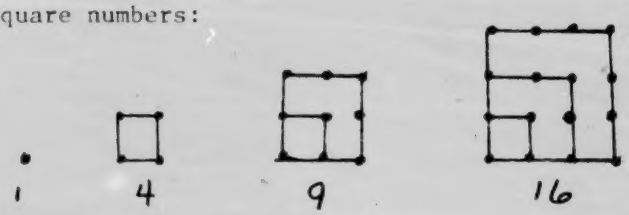
1. Any square number is the sum of two successive triangular numbers.
2. The nth pentagonal number is equal to the number n plus three times the (n - 1)st triangular number.
3. The sum of any number of consecutive odd integers starting with 1 is a perfect square.

Triangular numbers:



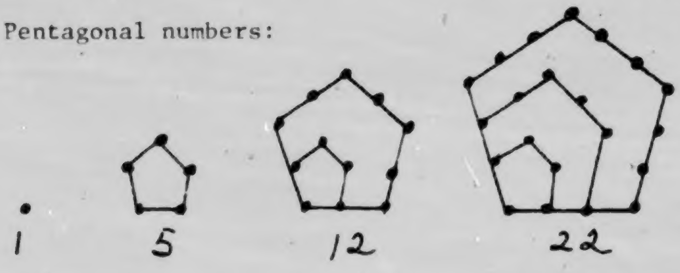
and so on

Square numbers:



and so on

Pentagonal numbers:



and so on

SKILLS BEING DEVELOPED

Analysis, application, evaluation.

CONTRIBUTED BY

Casey Withers Humphrey, East Area Math Resource, Minneapolis Public Schools, 722 Curfew Street, St. Paul, Minnesota 55114.

YO-YO PROBLEM

SUBJECT AREA

Math

OBJECTIVES

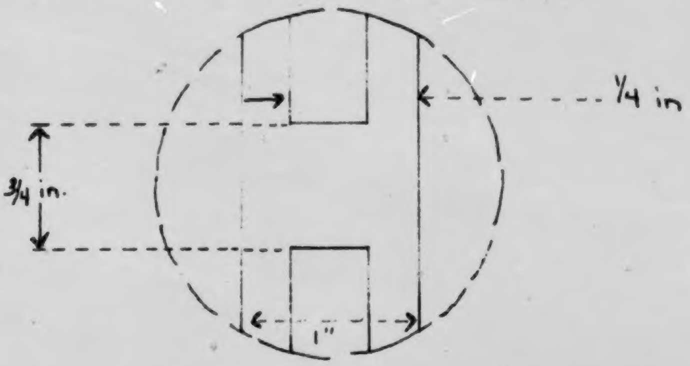
Students will be able to determine the volume of a yo-yo and a perfume bottle from given dimensions.

DESCRIPTION

Calculus students at Northeast High School in Lincoln are asked to solve unique problems such as these.

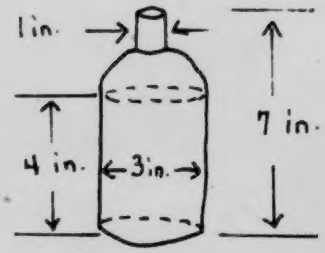
ACTIVITIES

A yo-yo is carved from a wooden sphere by lopping off the "poles" and cutting a groove around the "equator," as shown in the accompanying diagram.



Determine the yo-yo's volume from the given dimensions, assuming that the radius of the original sphere was 1 in.

A certain perfume bottle has the shape of a circular cylinder, surmounted by a spherical segment, surmounted by a smaller cylinder, as shown.



Determine the total volume inside the perfume bottle from the dimensions in the illustration.

SKILLS BEING DEVELOPED

Application

CONTRIBUTED BY

Buren Thomas, Chairman, Department of Mathematics, Northeast High School, Lincoln, Nebraska. Ideas taken from Lectures on Freshman Calculus - Cruse, Granberg, Addison Wesley Publishing Company, 106 West Station Street, Harrington, Illinois 60010.

KALEIDOSCOPE GEOMETRY

SUBJECT AREA

Math

MATERIALS

Two hand mirrors, pipe cleaners.

OBJECTIVES

Students will be able to create designs using mirrors at varying angles.

DESCRIPTION

This is an excitingly visual way to deal with geometric shapes, angles and number concepts. The correlation between mirror angles and geometric shapes is studied with mirrors!

ACTIVITIES

Experience #1

Place an object on the table between the positioned mirrors. Slowly close and open the kaleidoscope observing what happens to the number of images as you move the mirrors. Clearly, the smaller the angle measure, the greater the number of images.

Using the protractor to measure angles determined by the mirrors, complete the table.

Angle determined by the mirror	180	120		72	60		45	40		30
Number of imaged (include original object)			4			7			10	

Can you prdict the number of images for angles of:

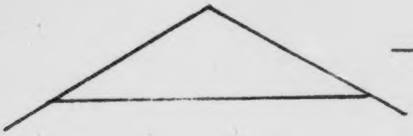
15° ________ 10° ________ 3° ________

Experience #2

When the angle determined by the mirrors is 120°, three images are seen. Placing a pipe cleaner representing a line segment on the table between the mirrors, it is possible to make an equilateral triangle. (Is it possible to construct other kinds of trinagles?) Note that squares, pentagons, etc. cannot be constructed with an angle of 120°.

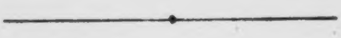
As the angle changes, the kinds of constructions that can be made also change. Complete the drawings to demonstrate the construction made using one pipe cleaner as a line segment. The first one is done for you.

a) 120°



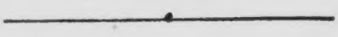
Equilateral Triangle

b) 180°



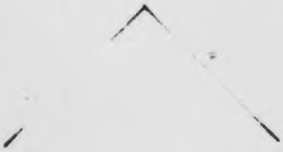
Parallel Line Segments

c) 180°



One Line Segment

d) 90°

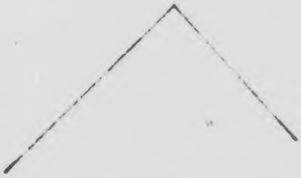


Square

e) 90°

Perpendicular Line Segments

f) 90°

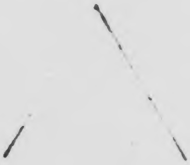


Parallel Line Segments

g) 72°

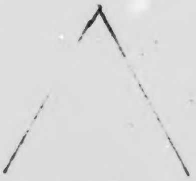
Pentagon

h) 60°



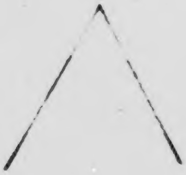
Hexagon

i) 60°



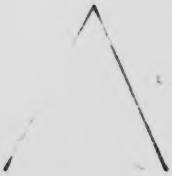
Equilateral Triangle

j) 60°



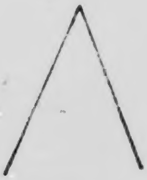
Three Pointed Star

k) 51 3/7°



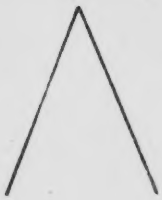
Septagon (7 sides)

l) 45°



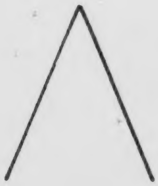
Octagon

m) 45°



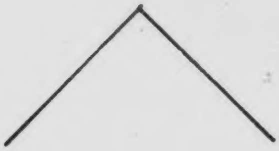
Square

n) 45°



Four Pointed Star

o) 90°



Rhombus

Name possible constructions using these angle measures:

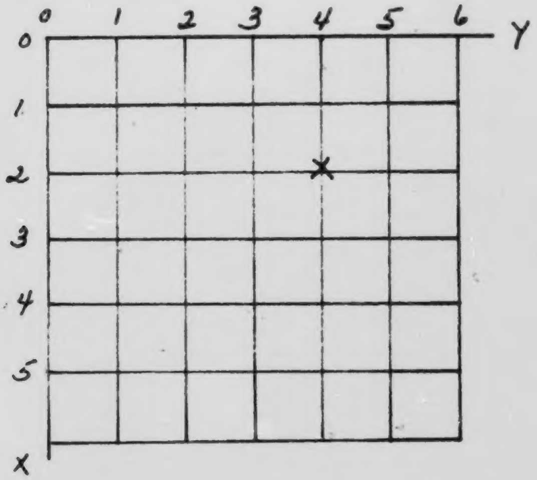
40° ____

36° ____

30° ____

Experience #3

A. On the coordinate paper below an x has been placed on the point (2,4). Put x's on the points (4,6), (0,5) and (5,3). Check your results with someone.



B. Place a coordinate system on the table and with the mirrors determining an angle of 90° place one mirror along the x-axis and one mirror along the y-axis.

Place 7 small objects on the following points of the coordinate system.

(0,6), (1,5), (2,4), (3,3), (4,2), (5,1), (6,0)

Describe what you see.____________________

C. Make at least two designs on the grid, recording the points used. Title the designs created.

	Title	Coordinates (Points Used)
Design #1		
Design #2		
Design #3	Circle	

D. Optional: Give your recording of points for one of the designs above to a friend. Ask him to make this design by placing objects on the coordinates you have identified.

Experience #4

A. Using available materials, make some designs that allow you to present beauty, harmony, and symmetry in geometric form. Take some time!! Use your imagination!! Be creative!!

B. Optional: Choose a partner, each of you having a set of mirrors. Create a design. Then have your partner create an equivalent design. He must do this without looking at your design--only be receiving oral instructions from you.

Experience #5

Study a variety store kaleidoscope to determine how it works. You can determine the size of the angle by:

_______ a) Observation (that is, guess).
_______ b) Count the number of images and divide into 360.
_______ c) Use a protractor.

You are now finished. If you enjoyed the experiences, share your findings and designs with some friends. If you did not enjoy the experiences, smash the mirrors and have 14 years of bad luck.

P.S.
1. The next time you are in a clothing store, look for a kaleidoscope.
2. Try some experiments where you lay letters and/or numerals on the table between the mirrors.
3. How would you find the perimeter of a regular pentagon in a "world" determined by 72° mirrors?
4. Make some discoveries of your own.

SKILLS BEING DEVELOPED

Application, synthesis

CONTRIBUTED BY

Carl Clark, H. E. M. S. Westside Community Schools; Dave Thronson, Valley View Junior High; both in Omaha, Nebraska.

THE DUODECIMAL (BASE TWELVE) SYSTEM

SUBJECT AREA

Math

OBJECTIVES

Students will learn to calculate with new number symbols.

DESCRIPTION

It is interesting to represent numbers by using bases other than our base ten. Here are some activities using a base twelve system.

ACTIVITIES

In any base the numeral that stands for the base always has this form:

$10_{(\text{base})}$.

In base ten, 10 stands for ten.
In base seven, 10 stands for seven.
In base four, 10 stands for four.
In base twelve, 10 stands for twelve.

10 is always the first (smallest) two-digit numeral in any base. A numeral that stands for number smaller than the base must be a one-digit numeral. Therefore, in any base larger than ten, we must make up one-digit numerals to stand for ten, eleven, etc. In base twelve, T is commonly used for ten, and E for eleven.

In base twelve, the counting numbers from one to fifteen are written:

1, 2, 3, 4, 5, 6, 7, 8, 9, T, E, 10, 11, 12, 13

Expanded form for a base twelve numeral looks like this:

$$\begin{aligned} 1T3_{12} &= (1 \times 12^2) + (10 \times 12) + 3 \\ &= 144 + 120 + 3 \\ &= 267 \end{aligned}$$

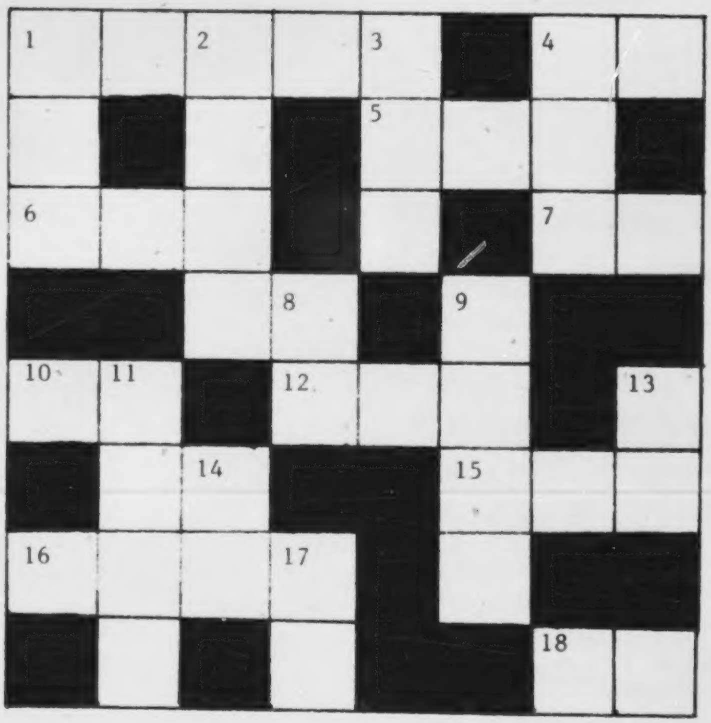
To express a base ten numeral in base twelve, we use the same division procedure as before. For example,

$$490 = \underline{\quad ? \quad}_{12} \qquad \begin{array}{r} \overline{0}\text{r}3 \\ 12\overline{)3}\text{r}4 \\ 12\overline{)40}\text{r}10 \\ 12\overline{)490} \end{array}$$

Writing the remainders from top to bottom, using T for 10, we get $490 = 34T_{12}$.

Worksheet 5:

Show your work for each problem on the back.



ACROSS

1. $103 = \underline{\qquad}_{(3)}$
4. $43_{(5)} = \underline{\qquad}_{(10)}$
5. $1112_{(5)} = \underline{\qquad}_{(10)}$
6. $322 = \underline{\qquad}_{(8)}$
7. $18 = \underline{\qquad}_{(7)}$
10. $221_{(3)} = \underline{\qquad}_{(10)}$
12. $94 = \underline{\qquad}_{(8)}$
15. $655 = \underline{\qquad}_{(9)}$
16. $11 = \underline{\qquad}_{(2)}$
18. $1002_{(4)} = \underline{\qquad}_{(10)}$

DOWN

1. $433_{(6)} = \underline{\qquad}_{(10)}$
2. $185 = \underline{\qquad}_{(4)}$
3. $133_{(9)} = \underline{\qquad}_{(10)}$
4. $186 = \underline{\qquad}_{(8)}$
8. $241_{(5)} = \underline{\qquad}_{(10)}$
9. $10550_{(7)} = \underline{\qquad}_{(10)}$
11. $1156 = \underline{\qquad}_{(6)}$
13. $100101_{(2)} = \underline{\qquad}_{(10)}$
14. $100_{(9)} = \underline{\qquad}_{(10)}$
17. $47 = \underline{\qquad}_{(47)}$

Do the following worksheet:

Worksheet 6:

Change these base twelve numerals to base ten numerals by writing them out in expanded form, etc.

1. $209_{(12)}$ =
2. $T13_{(12)}$ =
3. $EE8_{(12)}$ =
4. $7TE_{(12)}$ =
5. $1487_{(12)}$ =

Use repeated division to change the following to base 12. (Be sure to use T for ten and E for eleven.)

6. 1504 = ____________(12)
7. 2615 = ____________(12)
8. 1450 = ____________(12)
9. 9876 = ____________(12)
10. 17,290 = ____________(12)

Using similar procedures, see if you can do these involving base 11. Base 11 uses the digits 0-9 and T.

11. Write the first twenty-five counting numbers in base 11.

Change:

12. $14T3_{(11)}$ = ____________(10)
13. $2T85_{(11)}$ = ____________(10)
14. 34,567 = ____________(11)
15. 7984 = ____________(11)
16. 10,905 = ____________(11)

Worksheet 7:

Look at these three examples. If you understand how the answers were obtained, copy and complete the problems. If not, GET HELP!

$$\begin{array}{r} 4067 \\ +\ 6565 \\ \hline 12654 \end{array} \text{ (base 8)} \qquad \begin{array}{r} 20212 \\ 2212 \\ +\ 12202 \\ \hline 120110 \end{array} \text{ (base 3)} \qquad \begin{array}{r} 4T7 \\ +\ 654 \\ \hline E3E \end{array} \text{ (base 12)}$$

1. $\begin{array}{r} 4\ 3\ 2 \\ +\ 5\ 1\ 5 \\ \hline \end{array}$ (base 6)

2. $\begin{array}{r} 1\ 0\ 1\ 1\ 0 \\ +\ 1\ 1\ 1\ 1 \\ \hline \end{array}$ (base 2)

3. $\begin{array}{r} 7\ 4\ 7\ 6 \\ +\ 6\ 3\ 6\ 5 \\ \hline \end{array}$ (base 8)

4. $\begin{array}{r} 3T68 \\ +2383 \\ \hline \end{array}$ (base 12)

5. $\begin{array}{r} 8267 \\ +6857 \\ \hline \end{array}$ (base 9)

6. $\begin{array}{r} 2122 \\ +\ \ 202 \\ \hline \end{array}$ (base 3)

7. $\begin{array}{r} 578T \\ +8669 \\ \hline \end{array}$ (base 11)

8. $\begin{array}{r} 4324 \\ +2323 \\ \hline \end{array}$ (base 5)

9. $\begin{array}{r} TE51 \\ +8379 \\ \hline \end{array}$ (base 12)

10. $\begin{array}{r} 4562 \\ +5536 \\ \hline \end{array}$ (base 7)

11. $\begin{array}{r} 4141 \\ +2332 \\ \hline \end{array}$ (base 5)

12. $\begin{array}{r} EE3T \\ +TE82 \\ \hline \end{array}$ (base 12)

13. $\begin{array}{r} 8028 \\ 5678 \\ +7381 \\ \hline \end{array}$ (base 9)

14. $\begin{array}{r} 6453 \\ 3252 \\ +6415 \\ \hline \end{array}$ (base 7)

15. $\begin{array}{r} 3021 \\ 2322 \\ 3132 \\ +2321 \\ \hline \end{array}$ (base 4)

16. $\begin{array}{r} 5143 \\ 2422 \\ +5433 \\ \hline \end{array}$ (base 6)

17. $\begin{array}{r} 2021 \\ 2122 \\ 1221 \\ +2022 \\ \hline \end{array}$ (base 3)

18. $\begin{array}{r} 10111 \\ 11001 \\ 10110 \\ 11101 \\ +10101 \\ \hline \end{array}$ (base 2)

19. $\begin{array}{r} 8734 \\ T481 \\ +3795 \\ \hline \end{array}$ (base 11)

20. $\begin{array}{r} 6475 \\ 5723 \\ +7657 \\ \hline \end{array}$ (base 8)

21. $\begin{array}{r} 15683 \\ TEE86 \\ +37159 \\ \hline \end{array}$ (base 12)

SKILLS BEING DEVELOPED

Analysis, application.

CONTRIBUTED BY

Lincoln Public Schools in workshops with Dr. Ronald Massie, Math Consultant.

MAGIC SQUARE

SUBJECT AREA

Math

OBJECTIVES

Students will be able to apply magic square to problems and expand into a theorem.

DESCRIPTION

Do you know that there is a secret square that tells you how to make up your own magic squares with any three numbers you choose?

ACTIVITIES

Do you know the secret square in terms of the three numbers x, y and z?

$x - z$	$x + z - y$	$x + y$
$x + y + z$	x	$x - y - z$
$x - y$	$x + y - z$	$x + z$

If you had chosen $x = 8$, $y = 5$ and $z = 2$ you would have gotten:

6	5	13
15	8	1
3	11	10

Problems:

1. Use the secret square to fill in at left for $x = 12$, $y = 7$, and $z = 3$. Magic sum is __________.

2. Here let $x = 15$, $y = 9$, and $z = 4$. Magic sum is __________.

3. Choose any 3 numbers to make up a magic square. The x number must be greater than the sum of the y and z numbers--unless you have studied the set of integers. Magic sum is __________.

Let y = f (x)

X_i = Number od Cell (box) below.
Y_i = The number in the X_i cell (box).

8	1	6
3	5	7
4	9	2

In general the equation, $Y = m X + b$ gives a magic square:

with a sum, $\sum = 15m + 3b$

$= \text{a multiple of } 3.$

Theorem:

Given two equations $Y = mX + b$ and $Y = Mx + B$, where $m \neq M$. If three equations are formed for each of the general equations so that $b_1 - b_2 = b_2 - b_3$ and $B_1 - B_2 = B_2 - B_3$ and the intersections of the graphs of the six equations so formed are determined, two magic squares can be formed, one using the abscissas of the points of intersection and another using the ordinates of the points.

The equations:
A. $Y = mx + b$
B. $Y = mx + b + k$
C. $Y = mx + b + 2K$
D. $Y = Mx + B$
E. $Y = Mx = B = K$
F. $Y = Mx + B + 2K$

Have your students solve the six simultaneous equations to get:

$$A \cap D = \left(\frac{B - b}{m - M}, \quad \frac{mB - Mb}{m - M}\right)$$

$$A \cap E = \left(\frac{B + K - b}{m - M}, \quad \frac{mB + mK - Mb}{m - M}\right)$$

$$A \cap F = \left(\frac{B - b + 2K}{m - M}, \quad \frac{mB - Mb + 2mK}{m - M}\right)$$

$$B \cap D = \left(\frac{B - b - k}{m - M}, \quad \frac{mB - Mb + Mk}{m - M}\right)$$

$$B \cap E = \left(\frac{B - b + K - k}{m - M}, \quad \frac{mB - Mb + mK - mK}{m - M}\right)$$

$$B\ F = \frac{B - b + 2K - k}{m - M}, \quad \frac{mB - Mb + 2Mk}{m - M}$$

$$C\ D = \frac{B - b - 2k}{m - M}, \quad \frac{mB - Mb + 2Mk}{m - M}$$

$$C\ F = \frac{B - b + 2K - 2k}{m - M}, \quad \frac{mB - Mb = 2mK - 2Mk}{m - M}$$

The geometric shape boundary formed by the intersection points should be discussed.

Abscissa Square

$\frac{B - b + K - 2k}{m - M}$	$\frac{B - b}{m - M}$	$\frac{B - b + 2K - k}{m - M}$
$\frac{B - b + 2K}{m - M}$	$\frac{B - b + K - k}{m - M}$	$\frac{B - b - 2k}{m - M}$
$\frac{B - b - k}{m - M}$	$\frac{B - b + 2K - 2k}{m - M}$	$\frac{B - b + K}{m - M}$

$$\sum = \frac{3B - 3b + 3K - 3k}{m - M}$$

Ordinate Square

$\frac{B - b + K - 2k}{m - M}$	$\frac{B - b}{m - M}$	$\frac{B - b + 2K - k}{m - M}$
$\frac{B - b + 2K}{m - M}$	$\frac{B - b + K - k}{m - M}$	$\frac{B - b - 2k}{m - M}$
$\frac{B - b - k}{m - M}$	$\frac{B - b + 2K - 2k}{m - M}$	$\frac{B - b + K}{m - M}$

$$\sum = \frac{3mB - 3Mb + 3mK - 3Mk}{m - M}$$

Cicero's 5 x 5 secret magic square

$x - y - z - v - w$	$x + z + v$	$x - z$	$x + y + z$	$x + w$
$x + y + w$	$x - y$	$x + y + z + v$	$x - v$	$x - y - z - w$
$x - y + v$	$x + y + v$	x	$x - y - v$	$x + y - v$
$x + y + z + w$	$x + v$	$x - y - z - v$	$x + y$	$x - y - w$
$x - w$	$x - z - 3v$	$x + z$	$x - y - z + 2v$	$x + y + z + v + w$

SKILLS BEING DEVELOPED

Application, analysis

CONTRIBUTED BY

Fred Hoofer, Staff Development Specialist, ESU #2, Fremont, Nebraska.

THE METRIC SYSTEM

SUBJECT AREA

Science, math

MATERIALS

The materials commonly available in a stockroom for science courses are sufficient for this unit; however, the following items may be added: metric tape measure, micrometer, and ocular micrometer.

Also, an excellent Bibliography of the Metric System has been prepared by the Minnesota Department of Education (Capital Square, 550 Cedar Street, St. Paul, Minnesota 55101).

OBJECTIVES

Each student will be able to:

1. Utilize a vocabulary of terms, units, and prefixes (C-1; A-1).
2. Convert from one unit to another within the metric system and be able to apply this skill in making actual measurements (C-2,3; A-2).
3. To analyze relationships between the various metric units such as mass versus weight and capacity in ml versus cubic measure in cm^3 (c-4).
4. Make measurements in the metric system effectively during classroom sessions (C-3).
5. Reduce a derived unit into fundamental units and to build derived units from fundamental units (C-4,5).
6. Describe and discuss the organizational framework of the metric system (C-5).
7. Apply spontaneously the metric system outside the class (A-3,4,5).
8. Be able to argue the comparative convenience of a decimal system of measurement (C-6; A-5).

DESCRIPTION

Because the metric system is the fundamental system of measurement commonly used in the sciences and because it has not been systematically taught in the lower grades, this unit is intended to be initiated early in any course of science for the gifted and talented in grades 10-12. The emphasis of this unit is to establish the basic skills and fundamentals and then build from these toward the more specialized applications in the specific science disciplines.

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ACTIVITIES

Introductory

Each student will:

1. Prepare a list of the advantages and the disadvantages of the English and the metric system, keeping this list to compare with a post test to be done at the end of the unit.

2. Complete a worksheet on the English system which illustrates the difficulties of this system.

3. Hear a class explanation of and complete a worksheet on the conversion of units by a horizontal display of the range of values.

4. Estimate mass, length, and volume of a given set of objects then measure each for comparison with the estimate.

Developmental

Each student will:

1. Refer to the bulletin board for illustrations such as "Miss Metric" and cartoons.

2. Drill on handling units by the methods of unit pricing and dimensional analysis, i.e., the factor-label method and ration-proportion.

3. Participate in laboratory activities and (1) instruct them how to use measuring tools (such as meter stick, analytical balance, graduated cylinder, pipet, buret, syrine, micrometer, vernier scales, etc.), (2) give practice in the use of these tools to gain proficiency, and (3) that develop understanding of the concept of fundamental units.

4. Develop computational skills by making derived units and derived data from the fundamental units or measurments such as work, energy, force, rate, change in temperature.

5. Use units of measurement to understand and define the relationships between units and the objects being measured, i.e., use cm^3 to define the liter and to illustrate that a number is meaningless without the unit which describes the property being measured.

6. Use the taking of measurements in the class and/or lab to develop the concepts of accuracy, precision, and significant figures.

Culminating

Each student will:

1. Play "metric" a game.

2. Devise a metric clock-fact and time counting system.

3. Devise a metric compass for finding directions in two or more dimensions of space (not necessarily restricted to Euclidean space).

4. Share the results of independent studies by posters, bulletin board displays, reports, seminars, etc.

5. Brainstorm concepts of standard measurements and devise a "bureau of standards."

6. Take a post test on the estimation of length, mass, and volume of a given set of objects.

7. As a post test, make a list of the advantages and disadvantages of the English and metric system then compare this list to the pretest on the same task done at the beginning of this unit.

8. Participate in panel discussions on the relative merits of the metric and the English system, i.e., by discussing a dilema.

Enrichment

1. Posters - to illustrate measurement scales such as correlating clothing worn at a given temperature and units of a temperature scale or an organism adapted to a characteristic temperature (polar bear to illustrate zero ^{o}C).

2. Reports - historical development of measurements, development of the bureau of standards, relationship of units of measurements and tools to measure them, development of measuring tools (precision instruments in contrast to cruder tools of the past).

3. Games - Let the student devise a game to illustrate the use of metric units to younger child or to an adult.

4. Interview- ask an athlete whether he prepares differently for a 100 yard dash versus a 100 meter dash, ask a nurse or medical technologist to discuss problems of being confronted daily with conversion from metric to English to pharmaceutical units, ask an auto mechanic about the difficulty in dealing with both the English and the metric system in his shipment of parts or shop work.

5. Laboratory Work - measure vital measurements of self in metric units, calibrate an instrument such as a buret, measure objects with tools that use a vernier scale (such as a barometer), make a metric "blueprint" of your home, make a metric map of your neighborhood, devise a grid system for mapping the earth or for use in planetary surveying in another star system.

Questions for Discussion

1. What is the numerical value of milli, centi, etc.?

2. What is the prefix for the value 10^{-3}, 10^{6}, etc.?

3. How many grams are in a kilogram..micrometers in a centimeter...etc.?

4. How many significant figures are in 6.053, in 0.0250, etc.?

5. Which of these numbers are significant figures...9.40 l, 3.106 g, 9.002 cm, etc.?

6. Calculate the density of a block given these measurements of shape and mass (data to be supplied by the teacher).

7a. Why are there 60 seconds in a minute or 60 minutes in an hour instead of some other value -- why 60?

7b. Could a metric scale or decimal system be conveniently substituted for telling time...how...why...?

8. How far will a microorganism travel in a minute if it travels across a 5 cm^2 microscopic field of view in 2 seconds?

9. Determine the better purchase of items based on unit pricing analysis, using the following data (to be supplied by the teacher).

10. What is so systematic about the metric system--how it is organized?

11a. What is the role of a bureau of standards?

11b. Consider the novel Fahrenheit 451 by Ray Bradbury and then discuss this analogy: supposing that along with the books all measuring tools and standards of measurement were lost, how might the people recreate a system of measurement form scratch?

12. So far we have stressed a decimal basis for the metric system. Can you suggest alternate bases and explain your choice (i.e., binary, natural log, Mayan numerals, etc.).

Evaluation

1. The students' vocabulary of terms and prefixes will be evaluated by multiple choice questions.

2. In a lab practical the student will measure a set of objects having a variety of sizes and representing mass, volume, and distance measurements then convert the actual measurements to the meter-kilogram-second system and/or the centimeter-gram-second system.

3a. Given a set of objects the student will estimate, with 25% of the actual value, measurements of mass, length, and volume.

3b. The student will correlate units with objects that are measured with specific units (i.e., the length of a box is measured in m rather than l or °K).

4a. Given a set of derived units the students will convert them to fundamental units (convert joules to ergs, newtons, to dynes, etc.).

4b. Given initial and final measured values the student will calculate derived measurements (i.e., change in temperature, etc.).

5. Student-initiated extra credit assignments will be pursued by students having a special interest in a specific topic.

6. The student can present sound defense for the use of the metric system during classroom discussions and through differentiated assignments and he can enumerate ways in which he has been able to use the metric system in his daily living.

7. The student will take an active roll in debates and duscussion rather than be a passive or disruptive class member, as evidenced by such actions as presenting information, synthesizing data, teamwork, reaching beyond the minimum requirements of the assignments, resolving dilemas, problem solving, and creating new concepts.

VARIATIONS

1. Pretest on the English System

   a. How many ounces are in 14½ pounds?
   b. The police confiscated 85 ounces of heroin. How many pounds are in this?
   c. A football field is 120 yards long (including the end zones). How many inches are in this?
   d. Bill is 67 inches tall. How many feet is this?
   e. A recipe calls for 1½ quarts of orange juice. How many cups is this?
   f. One cubic foot of water weighs about 64 pounds. How much does 27 cubic inches weigh?
   g. You have ordered 3 cubic yards of black dirt. Your wheelbarrow holds 2 cubic feet in a load. How many wheelbarrow loads will it take to move this load?

2. Dilemma

A garage operator has a work crew of old, experienced hands who are expert in the reparies of American-made vehicles, but they all refuse to buy metric tools or to work on foreign cars. The number of imported cars in the neighborhood is increasing rapidly and business is declining just as rapidly.

Should the garage operator continue to do business for the benefit of his present employees or should he release them all and hire other mechanics who will work with metric tools?

3. The Game of Metric - to be played by three or four players.

Materials: One slotted block for each player and one deck of cards for each group. The deck, 42 cards in all, should contain two of each of the following: kiloliter, hectoliter, decaliter, liter, deciliter, centiliter, milliliter, kilogram, hectogram, decagram, gram, decigram, centigram, milligram, kilometer, hectometer, decameter, meter, decimeter, centimeter, millimeter.

The players decide who is to deal. After shuffling, six cards are dealth to each player. The object of the game is to arrange six cards, all measuring only one quantity (length, weight, or volume), in consecutive order in the six slots, from small to large.

After the deal, the players can put as many of their cards into the slots as they desire. The dealer turns the top card over starting a discard pile next to the cards left in the deck. Each player (starting with the dealer) takes turns and draws the top card from the deck or the discard pile. He then must discard one card into the discard pile. At any time between drawing and discarding, he may put cards form his hand into the slots. He may rearrange cards in the slots or take them out if he wants to at this time.

When a player has six cards in the slots, he discards and says "Metric" and either "length," "weight," or "volume" to indicate what kind of cards he has arranged.

Opponents then check his rack and if any errors are noted, the incorrect cards are removed and put on the bottom of the discard pile and the offending player is dealt enough cards from the top of the deck to make him have a total of six cards. Play then continues.

If the opponents agree that a correct "Metric" has been made, the player who did it gets 5 points for going out and all players each get as many points as they have cards correctly arranged in their racks. (This means that the winner gets a total of 11 points, the others from 1-5 points.)

Play continues with another game unitl someone has 25 points or more and the player with the most points wins.

Note: The correct orders are as follows:

Length: mm, cm, dm, m, dkm, hm, km
Weight: mg, cg, dg, g, dkg, hg, kg
Volume: ml, cl, dl, l, dkl, hl, kl

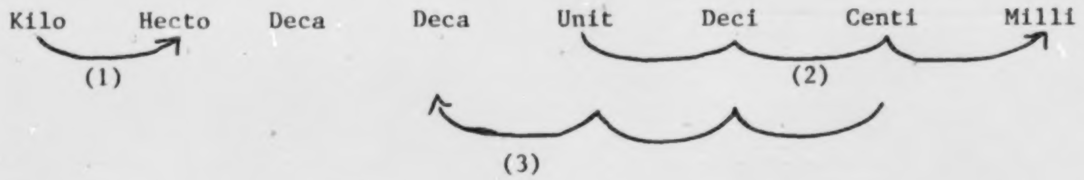
Only six of the seven in any one category will be used on one time, and the six in the rack must be consecutive.

CONVERSION OF UNITS BY A HORIZONTAL DISPLAY

Most presentations of the metric system list the prefixes in a vertical sequence. However, a horizontal presentation (larger to smaller - left to right) serves an additional function: it indicates the number of places the decimal needs to be moved and the directions to move the decimal. For example: to change from larger to smaller units move the decimal to the right increasing the number of digits before the decimal point.

k	h	dk	m,l,g	d	c	m
Kilo	Hecto	Deca	Unit	Deci	Cent	Milli
one thousand times	one hundred times	ten times	gram meter liter	one tenth of	one hundredeth of	one thousandth of

EXAMPLES:



(1) 53.21 kg = 532.1 hg (to change kilo to hecto, move decimal one place to the right)
(2) 3.15 l = 3,150 ml (to change unit to milli, move the decimal three places to the right)
(3) 2685.1 cm = 2.6851 dkm (to change centi to deca, move decimal three places to the left)

Work Sheet Examples

1. 37 km = __________ cm
2. 123.54 g = ________ kg
3. 24.68 l = ________ ml
4. 35.4 mg = ________ g = ____________ kg
5. 55.6 m = _________ mm = ____________ km

.
.
.

15. 1.54 gal = _______ cups (to illustrate the difficulty of a nondecimal system)

SKILLS BEING DEVELOPED

*C1, A1, etc., refers to the nature and level of the objective as described by Bloom and Krathwohl. C1 is an objective in the cognitive domain at the 1st or knowledge level; A1 is an objective in the affective domain at the 1st or awareness level.

Cognitive:	Affective:
1. Knowledge	1. Receiving
2. Comprehension	2. Responding
3. Application	3. Valuing
4. Analysis	4. Organization
5. Synthesis	5. Characterization
6. Evaluation	

CONTRIBUTED BY

Ronal Mehlen, Irvin Lucas and Catherine Steelman, Winston-Salem/Forsyth County Schools

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MIXED POLYGONS AND CIRCLES

SUBJECT AREA

Math

OBJECTIVES

Students will gain practice in computing area.

DESCRIPTION

Students must calculate answers to several problems in order to decode a puzzle.

ACTIVITIES

30,912--15,400--390--176--30,912--352--90   6--2530--7.2

2464--5.6--15,400--30,912--5.6--7.2

in 1610, computed to 35 decimal places by using polygons having 2^{62} sides. This task, which took up most of his lifetime, was considered so extraordinary that the number was engraved on his tombstone.

Solve the following problems. Use your answers to decode the puzzle above. ($= \frac{22}{7}$). Place letter at left above the answer you obtain.

Ⓓ If a triangular shaped garden has sides each 30 meters and an altitude of 26 meters, how much area does it cover? ___m^2

Ⓗ How much fencing would be required to enclose the above garden? ___m

Ⓐ The base of a certain wooden toy box is shaped like a parallelogram. With a base of 55 centimeters and altitude of 46 centimeters, how much wood is required to make a lid for the toy box? ___cm^2

Ⓔ To trim a square bulletin board with a wood strip, how much wood is required if the side of the bulletin board is 1.4 meters? ___m

Ⓤ How much material is needed to make a circular table cloth with a radius of 70 cm? ___cm^2

Ⓝ A classroom is equipped with 8 tables with trapezoid-shaped tops. How much wood was required for all of the tops if the bases are 1.55 m and .85 m and the distance between the bases is .75 m? ___m^2

Ⓥ If each of a pair of curtains is 2 meters long and 1.5 meters wide, how much cloth is needed for the pair? ___m^2

Ⓒ How much glass is needed to make a circular mirror with a 56 cm diameter? ___cm^2

Ⓞ How much wood is needed to fram the mirror above with a wood strip? ___cm

Ⓛ A certain latch hook rug requires 4 strips of yarn per square centimeter. How many yarn strips will be required if the rug is 84 centimeters wide and 92 centimeters long? ___strips

Ⓟ How much binding would be needed to bind all four sides of the above rug? ___cm

(Answer: Ludolph Van Ceulen)

VARIATIONS

Puzzles of this sort can be used at any time for any concept.

SKILLS BEING DEVELOPED

Analysis, application.

CONTRIBUTED BY

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WORKING WITH ALGORITHMS

SUBJECT AREA

Math, All

MATERIALS

Large representation of maze and solution to maze. Chart of symbols to use in algorithms. Overhead projector and plastic.

OBJECTIVES

Students will be able to:

Break a simple problem down into its component parts thus analyzing and recording each step toward its solution.

Discern organization within each problem.

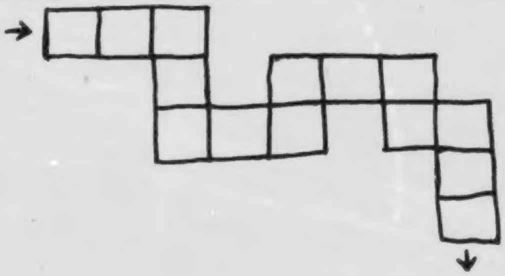
DESCRIPTION

Algorithm is a systematic method of attacking a problem but keeping track of the progress you've made. By presenting students this unit devised by Lee Knutsen of Pasadena, California, students should be able to structure their own algorithms when solving a problem.

ACTIVITIES

Lesson 1

1. Discuss algorithms - "a way of conceptualizing a method of operation.
2. Definitions:
    a. Procedure for doing something where every step is clearly defined.
    b. Steps do not depend on opinion or "common sense." There is a clear way of deciding choices.
    c. A logical method of attacking a problem.
    d. Guaranteed to finish.
3. Present maze algorithm and maze. Work through the entire maze using maze algorithm. Let's list together directions for a robot to use in proceeding through this maze.



Provide students with symbols for maze. Devise correct algorithm together.

4. Give them time to come up with a type of maze (either individually or in groups) that the algorithm will not solve. (There are several.)
5. Use opaque projector to share the maze that does not fit the algorithm. (Circular maze, 3-dimensional maze)
6. Now, together with the students, delimit the title of the maze algorithm so it will specify exactly what kind of maze it is designed for.
7. Go back to definitions. Do they all fit this algorithm?
8. Decide on some additional definitions. Hopefully they will come up with:
   a. Individual steps are doable.
   b. Decisions can be made on an objective basis.
   c. A person following the algorithm does not need to know what is reasonable or unreasonable.
   d. "A robot could do it."

Lesson 2

1. Review lesson 1.
2. Give them a problem for everyone to work out together..."Pick the person closest to the board." Show them where their errors are by demonstration. This should be oral.
3. In groups, give them 10 minutes to write how to get to the office. At this point, they should just write it as a list of instructions for you, the teacher, to follow.
4. Try instructions from each group as class goes with you. Purposely unhinge your mind so that you will not use common sense to fill in their ommissions. Then you can effectively demonstrate their errors.
   a. A typical first try is:
      "Go down hall" (which way is down? From which classroom? Did you have to walk through a closed door?)
      "Turn right at main corridor" (How can you tell it's the "main" one?)
      "Go until you see the office" (Where do you look? How do you know it's the office?)

   Certain basic vocabulary words are constant in any algorithm. For the above, "left, right, hall, corridor, etc., are constants.
5. You needn't tell them how to make all the corrections...they'll figure it out if you are dramatic enough!
6. Introduce the major symbols with examples.
7. Have entire class decide how to get out the door and write it on the board to give them a good start.

8. Break into groups (no more than 6...number of groups has to be even). Each group takes approximately 15 minutes to write and test an algorithm to get to the office, using the appropriate symbols.
9. Groups exchange their algorithms and test them out. Flaws are reported to author group, which fixes the error.
10. Near the end of the period, show the best algorithm on the opaque projector. Discuss.
11. Discuss: If an algorithm doesn't work, either the person following the directions goofed, the algorithm was incorrect, the assumptions built into it were not satisfied (you can't find way to the office if you speak Spanish and use an English algorithm. You can't get on the campus if the all is blocked.)

Lesson 3

1. Review lesson 2.
2. Try to elicit the following "discoveries."
    a. Writing an algorithm forces you to consider variables that are involved and how things change as the algorithm proceeds.
    b. It forces you to decide on what basis decisions will be made to govern the flow of the algorithm.
    c. You learn how to give clear, accurate descriptions to each other on how to do something.
    d. You become more aware of details in individual steps of doing something.
    e. Writing a workable algorithm will lead to understanding a concept more thoroughly and deeply than before.
    f. An algorithm contains the following: what to do, in what order, and what to do if there is a choice.
    g. An algorithm helps keep things organized when there are lots of parts to solving a problem.
3. Study the steps to writing an algorithm:
    a. Define the problem - what is to be solved? What is the goal?
    b Plan - What are the various courses of action? What are all the variables? List them.
    c. Analyze - How does each action relate to the goal?
    d. Design - Make sure there are as few boxes as possible by using arrows to go back to an action needing repetition.
    e. Implement - Analyze your design and plan for testing.
    f. Test
    g. Evaluate - What works well? What doesn't?

Lesson 4

1. Using the information they have on algorithms, the entire class or small groups of individuals should be able to, and want to, solve problems. This is also a good way to check someone's understanding of a concept you have taught.

VARIATIONS

MATH - Simple addition; simple subtraction; regrouping for addition; regrouping for subtraction; fractions: add, subtract, multiply, divide;

solving word problems (compare problems for key words which will give a clue as to what type of computation it requires):

*Lowest common denominator.

SCIENCE - Scientific method: "Mystery Powders;" identifying rocks; pond ecoloby; self-health.

*Deciding whether something is an acid or a base.

LANGUAGE ARTS - Haiku; Diamonte poem; limericks; finding a book in the library; punctuation rules.

*Finding a word in the dictionary.

SOCIAL SCIENCE - Where an Indian should build his camp. Who should get food stamps? Deciding where an explorer should land his ship in California; erecting a tee pee; hunting for food (many variables here); systematic search pattern; developing an orderly procedure for exiting in a fire drill; entering auditorium seats.

*Sorting.

MISCELLANEOUS - Making a sandwich, cleaning a room, solving a maze, getting to the grocery store, making up a board game.

SKILLS BEING DEVELOPED

Comprehension of symbolic systems (Sol Model)

CONTRIBUTED BY

Lee Knutsen, Mentally Gifted Minor Program Coordinator, Pasadena Unified School District, 351 South Hudson Avenue, Pasadena, California 91109.

SUBJECT AREA

Math

MATERIALS

Plenty of small macaroni for all. Parallelograms of opaque colored plastic for each student. (5 mill.) One piece of graph paper for each. Rulers.

OBJECTIVES

Students will be able to:

1. Arrive at the formula for a trinagle.
2. Arrive at the formula for a cylinder.

DESCRIPTION

Here are two activities through which students can discover formulas on their own.

ACTIVITIES

Cylinder

1. Ask students to pick up plastic parallelogram and make it into a bisquit can by taping it. (Some will do this the "fat" way; others the thin way.)
2. Compare cans. Which will hold more? (short can holds more) Why?
3. What makes the difference in the volume of a cylinder? (It is proportionate to r^2).
4. So how can we state the formula? ($\pi r^2 h$ = volume of cylinder)

Triangle

1. Give each student a piece of graph paper.
2. Instruct them to draw a rectangle anywhere on graph lines and cut it out.
3. Have students draw within the rectangle a triangle of any shape which has one full side of the rectangle as its base and extends to side opposite base.
4. Draw another line if necessary, to form three triangles, carefully let out all three.

5. Note: No matter how the students have drawn their triangles, the smaller two will fit into the larger.

6. What is formula then for a triangle? (1/3 bh of rectangle).

SKILLS BEING DEVELOPED

Synthesis, application.

CONTRIBUTED BY

Sharon Young, ECA Consultant, Boulder Colorado at 1977 ECA Conference for Gifted & Talented.

CONE HEADS

SUBJECT AREA

Math

MATERIALS

Rectangles of construction paper for each pair of students large enough to have excess when rolled and placed in can. One can (orange juice is best) for each pair of students. Plenty of miniature macaroni for each pair. Scotch tape.

OBJECTIVES

Students shall be able to arrive at the formula for a cylinder.

DESCRIPTION

Some gifted students seem to retain mathematical formulas better when they understand the principles behind them. Activities like this illustrate those principles.

ACTIVITIES

1. Divide students into pairs. Distribute necessary materials.

2. Give the students the following instructions:
   - -Make your piece of paper into a cone shape by rolling it and taping one edge into a point.
   - -Drop cone into can until point touches the can bottom and spread cone until exact perimeter of top of can.
   - -Draw line around base of cone.
   - -Cut off excess paper and tape cone into solid shape.
   - -The cone should now fit into can with point touching can bottom and cone base reaching and resting around top can rim.

3. Problem: Have students hypothesize how many cones of macaroni will it take to fill the cylinder? Then have them experiment until they discover the answer. (Should equal three conesful).

4. Put formula, $1/3 \pi r^2 h$, on board.

Discuss each component of formula.

VARIATIONS

Same process would work with cube and pyramid.

SKILLS BEING DEVELOPED

Analysis, application.

CONTRIBUTED BY

Sharon Young, in 1977 ECA Conference, ECA Consultant, Boulder, Colorado.

SYMBOLIC LOGIC

SUBJECT AREA

Math

MATERIALS

Adler, Irvin. *Logic for Beginners*. New York: John Day Co., 1964

Allen, Laymen E. *Wiff'N Proof*. Yale Law School, New Haven, Conn.

Johnson, Donovan A. and Rising, Gerald R. *Guidelines for Teaching Mathematics*. Belmont, California: Wadsworth Publishing Company, 1967.

Lieber, L. *Mits, Wits, and Logic*. New York: Institute Press, 1954

Northrup, Eugene P. *Riddles in Mathematics*; *A Book of Paradoxes*. Princeton, New Jersey: D. Van Nostrand Company, Inc., 1944

Stoll, Robert R. *Sets, Logic and Axiomatic Theories*. San Francisco, California: W. H. Freeman and Company, 1961.

OBJECTIVES

1. Each student will recognize the need for a logical structure. (1,4)

2. Each student will recognize the symbols of logic and the various forms of symbolic statements. (1)

3. Each student will be able to produce his own Venn Diagrams, Euler Circles and truth tables in order to illustrate visually the reasoning process. (3,5)

4. Each student will be able to translate the logic used in daily decisions to symbolic form. (2,3)

5. Each student will detect a fallacy in logical argument. (4,3)

6. Given a puzzle or paradox each student will apply the principles of logic in order to judge the validity of the argument and explain the fallacy, if any. (2,3,4,6)

7. Each student will produce his own puzzles and paradoxes with the aid of symbolic logic. (3,5,4)

8. Each student will compare and contrast a two-column proof with a proof in symbolic form. (3,4,6)

9. Each student will formulate the proof of a mathematical theorem in symbolic logic. (3,5,4,2,1)

10. Each student will be characterized by his improved ability to reason logically. (Affective Domain-characterization by a value)

DESCRIPTION

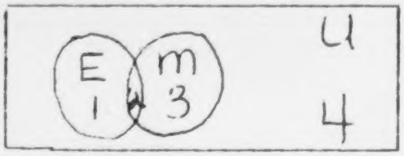
Through participation in classroom activities, students will be introduced to symbolic logic and will create truth tables, Venn Diagrams, Euler Circles, puzzles, paradoxes, and symbolic proofs. These activities will aid students to reason logically. A variety of activities which will aid students in recognizing the need for a logical structure and in developing the ability to reason logically. A variety of activities which will provide for individual differences in ability and interest, has been prepared. The Unit has been planned for gifted and talented students and offers many opportunities for divergent thinking.

ACTIVITIES

1. Distribute mimeographed sheets containing the four clauses
    a. I have a date Friday night or...
    b. I have a date Friday night and...
    c. If I have a date Friday night then...
    d. I have a date Friday night if and only if...

Ask the students to complete each statement in five different ways. (Be sure to tell them not to be concerned about whether their statements are true or false). Initiate discussion as to whether the students consider these statements to be True or False. Discussion should indicate need for a logical structure. Then introduce symbols and complete by inquiry method truth tables for $p \wedge q$, $p \vee q$, $p \rightarrow q$, $p \leftrightarrow q$.

2.



Draw this figure on the board. Tell students E represents English students and M represents math students

Have students identify by numbers the regions representing sets that might contain a student when it is known that:

  a. He is a math student
  b. He is not a math student
  c. He is a math student or an English student
  d. He is not an English student
  e. He is neither an English nor a math student
  f. He takes both English and math
  g. He is a math student but is not an English student

3. Ask students to write the negations of several statements. Then, point out the difficulty of negating statements that begin with "All," "Some," "No," "At least one," etc. Use Venn diagrams to illustrate a method for finding proper negations.

4. Discuss equivalence relationships. This activity will be used to introduce Euler Circles. Ask students to create a diagrammatic representation for several statements such as:

"All Elephants are Animals"
"Some Geometry students are smart"
"No English students take Latin"
"Some Geometry students take Latin $\wedge$ All smart students take Geometry and Latin"

5. Divide students into groups (4 to a group, if possible). Ask them to write statements p and q such that

   a. $p \wedge q$ is definitely true
   b. $p \wedge q$ is definitely false
   c. $p \vee q$ is definitely true
   d. $p \vee q$ is definitely false

   When groups have completed their work, write on board (with no discussion).

   $p \to q$ $\qquad\qquad$ $\sim p \to \sim q$
   $q \to p$ $\qquad\qquad$ $\sim q \to \sim p$

6. Assign sets of exercises to produce Venn Diagrams, Truth Tables, Negations, Euler Circles, and symbolic forms for various statements.

7. Give students several arguments in symbolic notation. Such as:

   $p \to q$
   $r \to s$
   $t \to \sim u$
   $q \to r$
   $v \to p$
   $\sim u \to \sim s$
   Conclusion: $v \to \sim t$

   Then ask them to test the validity and discover fallacies if any.

8. Arrange students in rows of 6-8. Give first person in each row the same statement p. Ask them to complete a conditional in the form $p \to q$ and tell the second person statement q. The second person should then complete a conditional of the form $q \to r$ and give third person statement r. Continue this process to the last person in the row. Each student should remember his own conditional. At this point, for a row of six you should have the following symbolic argument:

   $p \to q$
   $q \to r$
   $r \to s$
   $s \to t$
   $t \to u$
   $u \to v$ $\qquad\qquad$ Conclusion: $p \to v$

   On small slips of paper (one for each student) the teacher has written (1) leave your conditional as is or (2) write the inverse of your conditional or (3) write the converse of your conditional or (4) write the contrapositive of your conditional. (The great majority should say leave conditional unchanged). Hand one slip to each student and ask them to write the required form of their conditional. Try to insure that you will have at least one valid and at least one invalid argument. Then ask students to randomly change seats within their own rows. Using a tape recorder, go down one row (in the new order and record one entire argument. Play back the recording until the class through discussion can translate the argument into symbolic form and determine its validity. Then record the second argument and proceed as before.

9. Teacher and students together translate a given two column proof into symbolic logic form.

10. Give the students three two-column proofs and three proofs in symbolic form. In groups, have them investigate the equivalency of these proofs.

11. Discuss the advantages and disadvantages of proofs in symbolic form.

12. Ask students to produce a two-column proof in symbolic form of a given mathematical statement.

13. When activity twelve has been completed, ask students to share and discuss their results.

14. Use Wiff-n-Proof as both an initiatory and culminating activity.

15. Students discuss their work with a professor of logic and a college campus.

16. Students do research in order to compile a list of well known puzzles and paradoxes.

17. Students create a puzzle or paradox of their own for class investigation.

18. Students will try to find in newspapers, books, magazines, etc., examples of fallacious arguments.

19. Students will invetigate the difficulty of writing computer programs without the use of flow charts.

20. Students will produce a proof in each of the following forms:
    1. Paragraph
    2. Two-Column
    3. Flow-Chart
    4. Symbolic Logic

21. Students will produce truth tables for various combinations of three or four simple statements.

22. Students will do research and prepare reports on famous logicians (Venn, Euler, Lewis Carroll, etc.)

Evaluation

1. Short quizzes
2. Class or small group evaluation of proofs, truth tables, Venn Diagrams, etc.
3. Wiff-n-Proof
4. Teacher evaluation of written assignments
5. Teacher or class evaluation of oral presentations and or discussion
6. Unit test (including questions which encourage creativity and divergent thinking.

SKILLS BEING DEVELOPED

One, two, three, etc., refers to the nature and level of the objective as described by Bloom. One is an objective in the cognitive domain at the first or knowledge level.

1. Knowledge
2. Comprehension
3. Application
4. Analysis
5. Synthesis
6. Evaluation

CONTRIBUTED BY

Barry Feree, Winston-Salem/Forsyth County Schools
Mike Britt, Winston-Salem/Forsyth County Schools

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SUBJECT AREA

Math

MATERIALS

Calculator

OBJECTIVES

Students will:

1. Be able to use calculator with ease.
2. Realize how practical math skills can be in other areas.

DESCRIPTION

Exercises to do with a calculator.

ACTIVITIES

1. Your Birthday
    Enter the number of the month you were born
    Multiply by 4
    Add 16
    Multiply by 5
    Subtract 7
    Multiply by 5
    Add the day of your birthday
    Subtract 365
    Press = and look at your display

Answer - Month and day of birth

2. Find the answer. Then match with a number in history.
    1. 1000 + 70 + 906
    2. 5000 - 3508
    3. 2000 - 150 - 1
    4. 5 x 5 x 2
    5. 37 ÷ 63 : 5
    6. 2 x 2 x 2 x 2 - 3
    7. 1976 - 200
    8. 3916 - 1958
    9. 100 : 2 : 5
    10. 20 x 4 ÷ 7

    a. In _____Columbus sailed the ocean blue.
    b. "Fourscore and seven..."
    c. Our Bicentennial
    d. The first ____amendments to the US Constitution are called the "Bill of Rights.
    e. Roaring ____'s.
    f. US first space shot.
    g. California gold rush in.....
    h. Our....th state - Hawaii
    i. Signing of the Declaration of Independence.
    j. .....original colonies.

3. Find the answer. Then match the dates with the inventors.
    1. 1000 ÷ 8 + 70 ÷ 800
    2. 2000 - 97
    3. 3000 : 2 + 344
    4. 3600 : 2 + 46
    5. 500 - 3166
    6. 1776 + 4

    a. Whitney
    b. Morse
    c. Franklin
    d. Bell
    e. Wright Brothers
    f. McCormick

7. 1976 - 137
8. 200 : 4 + 1307
9. 400 x 4 ÷ 193
10. 1776 + 200 - 100

g. Edison
h. Howe
i. Goodyear
j. Fulton

3. A few extraordinarily rich men have displayed the quirk of never carrying any cash. One of them was seized with a desire for a soft drink as he went past a soft drink machine on a hot afternoon. As usual, he had to turn to an aide for the cash, which in those memorable days was a dime.

People like that couldn't work this trick without turning to the aide or pretending to have some change. Presumably you aren't in that predicament. If you just happen to be without any change, however, you can pretend too.

Enter on the calculator (making sure it is in the chain mode) a figure that is double your age. Add 5 and multiply by 50. Add the amount of change that you have in your pocket, up to one dollar, but enter it as a whole number rather than a decimal number. Subtract the number of days in a year (365), add 115 and divide by 100. Now, at last, you can push the = key and see what has been going on in there. Your calculator will display one or two numbers to the left of the decimal point (one if you are less than ten years old, two if you are ten or more) and two to the right. The number or numbers on the left will be your age, and the numbers on the right will be the amount of change that you entered in the calculation.

4. Entertain a friend today. Hand him your calculator and a calendar and ask him to add the dates of any three successive days in a week and the dates of the corresponding days in the following two weeks - nine numbers in all. (The days should all be in the same month). Now he clears the calculator and hand it to you, remembering what the total of the nine numbers was.

Ask him for the first date and enter it on the calculator. Add 8 to it and multiply the rest by 9. Your total will be the same as his. (If nobody is around to be dazzled by this trick, you can always work it yourself).

SKILLS BEING DEVELOPED

Application

CONTRIBUTED BY

Mrs. L. Harbaugh, Wendell District #232, Wendell, Idaho.

NEWSPAPER MATH

SUBJECT AREA

Math

OBJECTIVES

Students will be able to analyze different aspects of the newspaper.

DESCRIPTION

The newspaper is an excellent resource for math activities. The activities can easily be stated so they reinforce the analysis, synthesis, and evaluation skills.

ACTIVITIES

1. Compare advertising and news space on a typical page in three newspapers. Graph your results.

2. Compare the sports, editorial, and front pages of three newspapers in terms of readability (level of difficulty - average size of words and average number of words per line). Graph your results.

3. Compare several products of your own choice according to cost in three different newspapers.

4. Skim through the pages of three different newspapers. Cut out the advertisements which catch your eye. Analyze why (size, appearance, copy, color, other). Ask other class members to do the same. Analyze the ads they chose. Compare.

5. You have been given $50 by the PTA of your school for your classroom. Using the newspaper, pick what you would buy (rug for floor, book shelf, books, etc.).

6. Compare three newspapers according to type size, headline size, number of words per line, columns per page, etc. Graph your results.

7. Study sales in the newspaper for six months. Are sales seasonal? If so, what is on sale in each season? Present your results to the class.

8. Make up your own analysis activities.

SKILLS BEING DEVELOPED

Analysis

FRAKIES

SUBJECT AREA

Math, Art

OBJECTIVES

Students will gain practice in making visual generalizations.

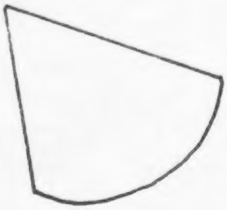
DESCRIPTION

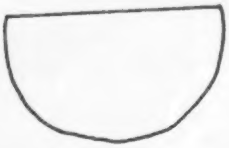
Students study a series of figures in order to determine what each has in common and then sort other figures accordingly.

ACTIVITIES

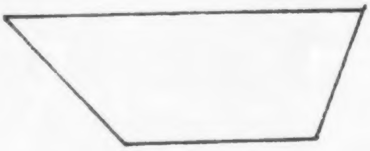
1. Directions: Try to figure out what a "melaj" is.

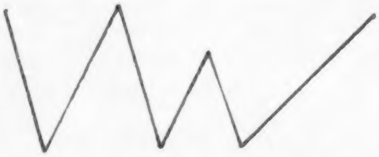
These are melajes:





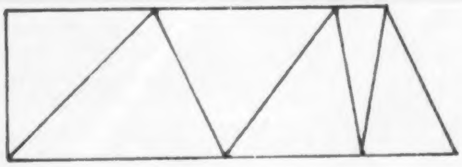
These are not melajes:



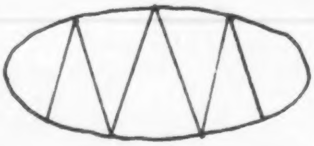


Are these melajes?

A



B



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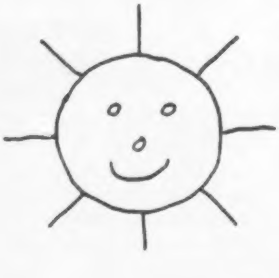

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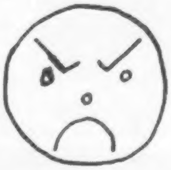
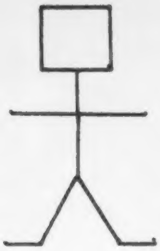
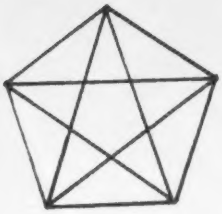
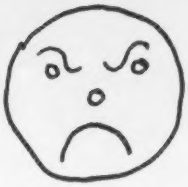
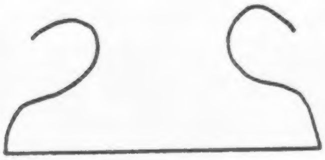


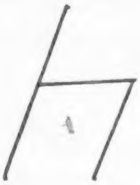
E  F  G 

Answers:
A. No
B. Yes
C. Yes
D. Yes
E. No
F. No
G. No

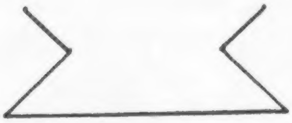
2. Directions: Try to figure out what a "fraky" is.

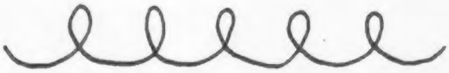
These are frakies:



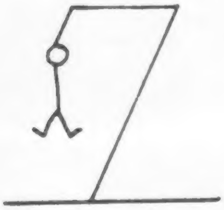


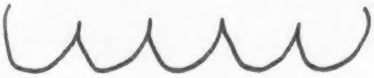
These are not frakies:



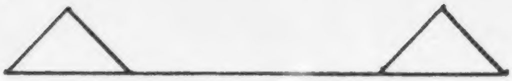


Are these frakies?

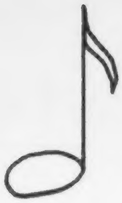
A. 

B. 

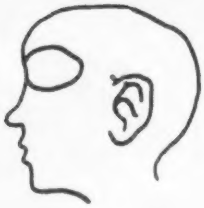
C.



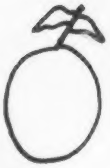
D.



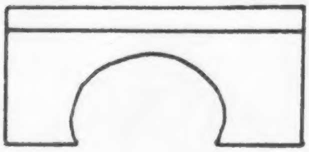
E.



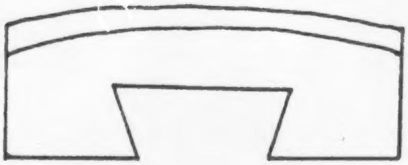
F.



G.



H.



Answers:
- A. Yes
- B. Yes
- C. No
- D. No
- E. Yes
- F. Yes
- G. Yes
- H. No

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation.

CONTRIBUTED BY

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USING MODULAR ARITHMETIC TO CREATE ARTISTIC DESIGNS

SUBJECT AREA

Math, Art

OBJECTIVES

Students will be able to:

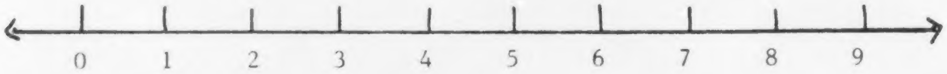
1. Perform modular arithmetic operations.
2. Create original artistic patterns using modular arithmetic.

DESCRIPTION

When you have completed this unit, you will find it very easy to create many different artistic designs. Before creating designs, however, you must first be able to master modular arithmetic.

ACTIVITIES

Normally when we add, we add along a number line with an infinite number of possible answers. The following diagram and examples show this.



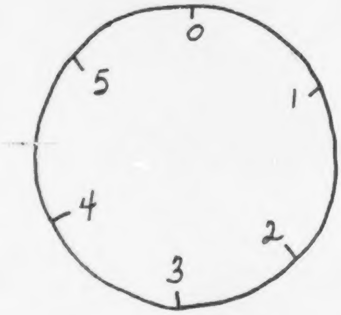
Examples: 2 + 4 = 6   9 + 7 = 16   3 + 5 + 8 = 16

In modular (or clock) arithmetic there are two important differences. First, the number of possible answers is limited. For example, in mod 6 there are only six numbers, 9, 1, 2, 3, 4, 5. Second, operations such as addition are performed in a circle, like a clock, instead of on a line.

Now let's see how clock arithmetic works. Let's use mod 6 to do some addition problems. Since it is mod 6, we will be using 6 numerals beginning with 0. We now make a clock using these six numerals, and work out the following examples. Can you discover how to arrive at the answers?

Examples:

2 = 3 = 5
5 + 4 = 3
4 + 3 = 1



clock for mod 6

See if you can correctly answer these problems using the mod 6 clock.

a. 3 + 1 = ?
b. 3 + 5 = ?
c. 4 + 5 = ?
d. 2 + 5 + 4 = ?
e. 5 + 2 + 1 = ?
f. 5 + 5 + 5 = ?

To discover patterns in modular arithmetic, we construct an addition table like the one below.

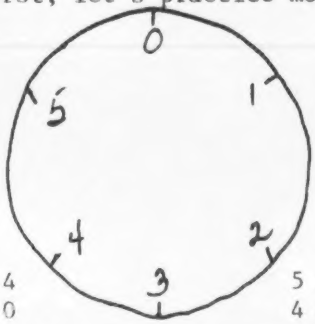
mod 6 +	0	1	2	3	4	5
0	0	1	2	3		
1	1	2				
2				5	0	1
3					1	2
4						3
5	5	0	1			

Make a table like the one above on your paper and fill in the missing numbers.

Select any other mod of your choice. Make a clock for that mod and construct an additional table using your clock.

1. What patterns do you see in the tables you have made?
2. Are the patterns the same for different mods?
3. What number added to any other number is always that other number? This number is called the identity element.
4. Is the identity element the same for all mods?

You can also use clocks and mod arithmetic to construct tables for multiplication. First, let's practice mod multiplication on the mod 6 clock.



mod 6 clock

Examples: 2 x 2 = 4
3 x 4 = 0
5 x 1 = 5
4 x 2 = 2

See if you can solve these problems.

a. 3 x 1 = ?
b. 4 x 5 = ?
c. 5 x 3 = ?
d. 5 x 5 = ?

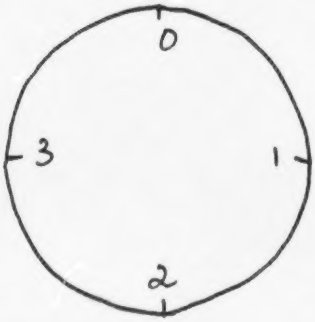
Construct the multiplication matrix for mod 6.

Choose any other mod. Make a clock for that mod and then construct the multiplication table.

1. What patterns do you see in the multiplication tables?
2. Are the patterns the same as the addition patterns?
3. What is the same and what is different?
4. What is the identify element in the multiplication matrixes?

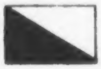
As you have seen, we can create many patterns by using mathematics. These patterns can also be very easily transferred to make an artistic design. Using modular arithmetic and your own creativeness, you can construct an infinite number of designs that are both interesting and fascinating.

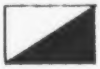
Let's use this mod 4 clock to construct an addition table.

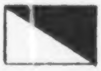


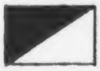
mod 4 +	0	1	2	3
0	0	1	2	3
1	1	2	3	0
2	2	3	0	1
3	3	0	1	2

The next step is to design a motif for each numeral on the clock. An example is shown below.

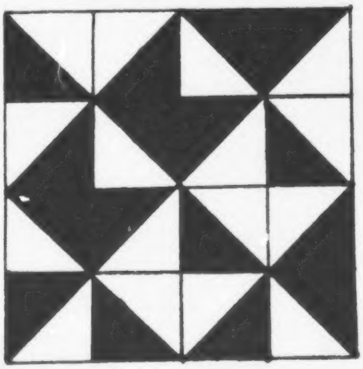
0 = 

1 = 

2 = 

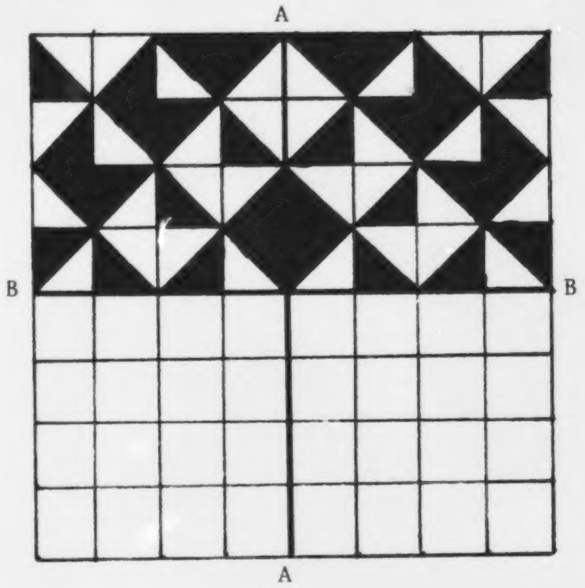
3 = 

Now, instead of filling the table in with numbers, fill in the matrix with the motifs which represent the numbers. Using the mod 4 addition table and the above motifs, you could come up with the design below. Colors may be used to provide more variation and more appeal.



Using addition or multiplication tables, different motifs, and various colors will enable you to create many different designs. Use any addition or multiplication table you have already made, or make a new one, and create your motifs for each number. Then make a design using the methods that were discussed in the example. Be creative and make designs which are entirely different from anything shown in this unit. There are literally thousands of different possible designs.

After you have finished your design, it is possible to create an even larger artistic design from the original. You may do this by using the properties of translation, transformation, reflection, or an idea of your own. For the example below, we have used the design shown on page 4 as our original design. Using the property of reflection, the new and larger design has been generated.



In the above design, the original design was placed in the upper left hand corner. The design was then reflected along line A to obtain the top half of the design. The same type of operation could be used to obtain the bottom half of the design. Use an earlier design you have created to make a larger design on a piece of graph paper. Use your own ideas and try different ones to create various designs.

As you have seen, there are many patterns in mathematics which can be turned into fascinating artistic designs. Much of mathematics is actually a study of different patterns, and being able to discover various patterns is both helpful to understanding mathematics and also challenging to discover. Have fun making your designs, but be creative and use your own ideas.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application, synthesis, evaluation.

CONTRIBUTED BY

Lincoln Public Schools workshop of math teachers, 1977, Dr. Ronald Massie.

MATHEMATIC CHOREOGRAPHY

SUBJECT AREA

Math, Dance

OBJECTIVES

Students will be able to invent their own dance by using the following mathematical technique.

DESCRIPTION

Use math to help students come up with a dance - an excellent individualized project!

ACTIVITIES

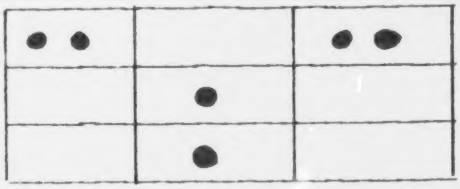
1. Pick a number to rename. Example: 6: 3-2-1 or 2-2-1-1, etc.
2. Divide at least three sheets of paper into sections representing the areas of stage and label with the call-letters:

Example:

	UC	
	C Center Stage	
	DC	

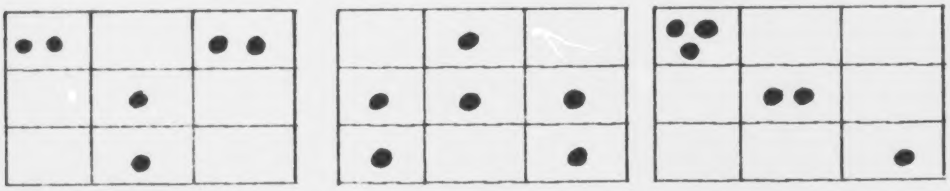
3. Take the renamed number and graph at least three possibilities. Remember that each number now represents a dancer on the stage.

Example: 2-2-1-1



4. Color-code the three plotted graphs to show where each dancer stands and how to move all of them from graph to graph. Make sure the path of travel is clearn when all dancers are moving at once.

Example:



5. Group students according to the number chosen in 1. Walk through student graphs and anme the positions as they change.
6. Now follow the graph and choreograph in-between the positions. Use your own movement creations or simplify by using only the basic movement steps.

Now . . . try these:

1. Pick a theme and create a special effect by encompassing visual and sound effects.
2. Devise your own symbols to represent the way you move in-between and add them to the graph.
3. Discuss how this activity is a way of organizing in other areas.

VARIATIONS

Perhaps the numerical combinations could be derived from a favorite musical selection.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation.

CONTRIBUTED BY

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NUMBER JOTTO

SUBJECT AREA

Math

MATERIALS

Ditto of handout below.

OBJECTIVES

Students will be able to formulate deductive reasoning through trial and error.

DESCRIPTION

This game is similar to the commercial game, "Mastermind" but needs no board.

ACTIVITIES

1. (This can be played with any number of digits, however, it is wise to start with 3 or 4.) Two players each pick 3 digits and place them in any order; they may have numbers which are repeated or include zero. (Later, they can expand to having blank spaces or more digits to increase the difficulty.)
2. Player number one first guesses any 3 digits in order to eventually deduce his opponents number.
3. Player number two responds to that guess in the following ways:
   T = Correct Digit, wrong location.
   P = Correct Digit, correct location.
   F = Wrong Digit.
   (For example, if player two's number was 473, and player one's guess was 274, player two should respond one T, one P, and one F.)
4. Then, based on his opponent's responses, player one guesses again and so on until the correct number is guessed.
5. The process is then reversed, player two guessing player one's number.

Handout: Number Jotto

T = Correct digit, wrong location
P = Correct digit, correct location
F = Wrong digit

<table>
<tr><td colspan="4">My number is____________ ______</td><td colspan="4">Opponent's Number
0 1 2 3 4 5 6 7 8 9</td></tr>
<tr><td colspan="4">Opponent's Guesses</td><td colspan="4">My Guesses</td></tr>
<tr><td>Number Guessed</td><td>T</td><td>P</td><td>F</td><td>Number Guessed</td><td>T</td><td>P</td><td>F</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

VARIATIONS

Can be adapted to a sport; for example, in baseball, hits could indicate correct digit-wrong location, strikes would be wrong digit and home run would signify right number-right location.

SKILLS BEING DEVELOPED

Analysis, application, synthesis

CONTRIBUTED BY

Sheila Kellenbarger, Pound Junior High; Dorothy Johnson, Mickle Junior High; both of Lincoln, Nebraska.

SOMA PIECES

SUBJECT AREA

Math

OBJECTIVES

Students will be able to develop geometric visual thinking through the following exercises.

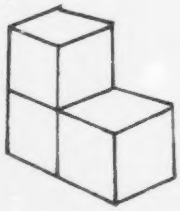
DESCRIPTION

Soma pieces are a kind of three dimensional version of tangrams. They were developed by Piet Hein, the Danish mathematician of "Super Egg" fame. He named them "Soma" from the passage in Aldous Huxley's Brave New World.

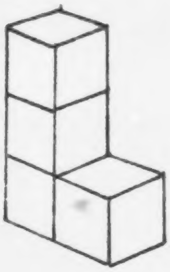
ACTIVITIES

Below are sketches of the 3-dimensional soma pieces. Actual pieces may be constructed with sugar cubes, however, they serve as an excellent visual activity as is.

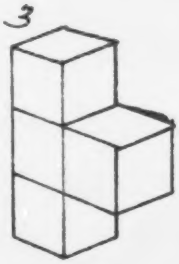
1



2



3



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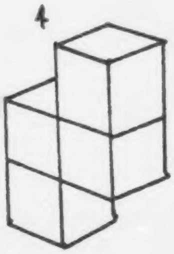

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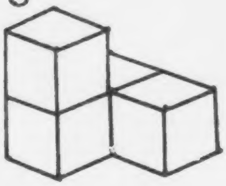

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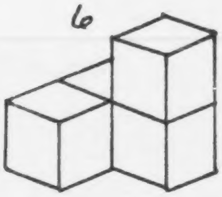
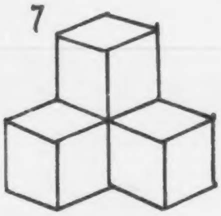
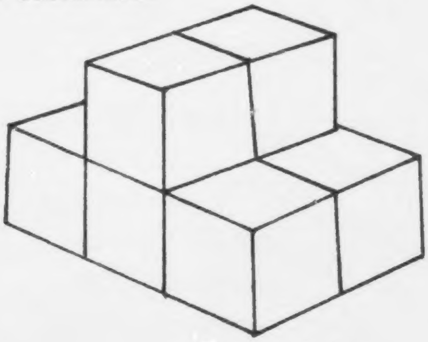


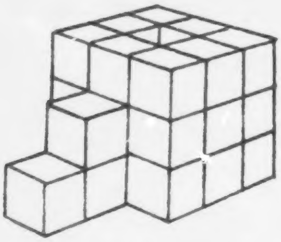
7



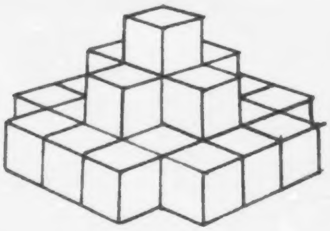
Problem One: Give the numbers of the two Soma pieces which you could use to form this stepped structure.



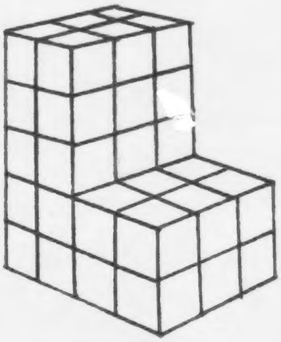
Which of these 12 forms cannot be built from the 7 soma pieces?



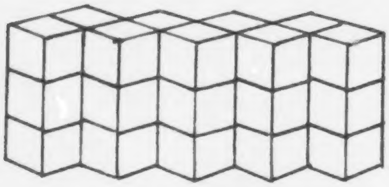
Well



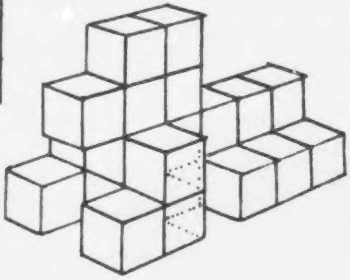
Pyramid



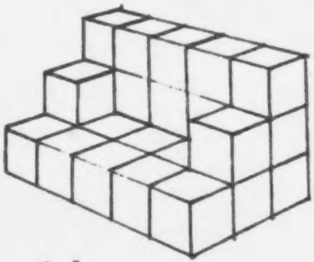
Chair



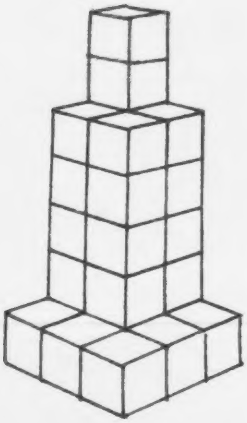
Wall



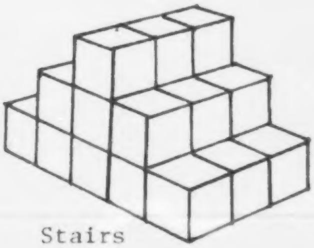
Dog



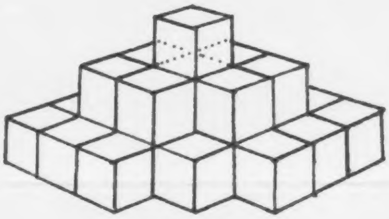
Sofa



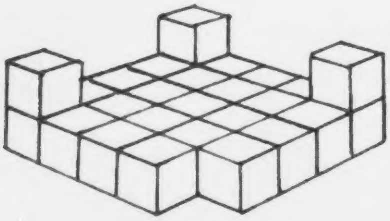
Skyscraper



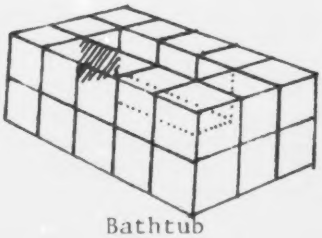
Stairs



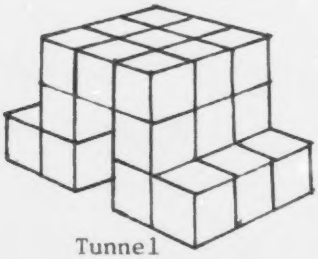
Steamer



Castle



Bathtub



Tunnel

SKILLS BEING DEVELOPED

Analysis, application.

CONTRIBUTED BY

Casey Withers Humphrey, East Area Math Resource, Minneapolis Public Schools, 722 Curfew Street, St. Paul, Minnesota 55114.

THE LAST STRAW

SUBJECT AREA

Math, All

MATERIALS

15 or 21 straws.

OBJECTIVES

Students will be able to formulate plans and adapt according to opponent's moves.

DESCRIPTION

This game requires seeing ahead several turns in order to force opponent to pick up the last straw. Simple object but can become very involved.

ACTIVITIES

Two players. Fifteen pieces of straw are tossed on a desk top. The object of the game is to force your opponent to pick up the last straw. Each player, at his turn, may pick up 1, 2 or 3 straws. Can you figure a way so you will win? What if you had 21 straws instead of 15?

SKILLS BEING DEVELOPED

Analysis, application, synthesis

CONTRIBUTED BY

Sheila Kellenbarger, Pound Junior High Schools; Dorothy Johnson, Mickle Junior High School; both of Lincoln, Nebraska.

LILLIPUTIAN MATH

SUBJECT AREA

Math, Language Arts

MATERIALS

Plenty of string for all, scissors.

OBJECTIVES

Students will be able to arrive at own formula for the Lilliputians' clothing of Gulliver.

DESCRIPTION

Students sometimes need to be reminded of how math skills fit in with other material they are studying. This activity, which is to be done in conjunction with the reading of *Gulliver's Travels*, is an example of how math skills could be integrated with reading.

ACTIVITIES

1. Review or reread episode from *Gulliver's Travels* where Lilliputians measure only the base of the thumb, the wrist, and the neck to mid-thigh and are able to make an entire set of clothes for him. (Remember: it takes 1,728 Lilliputians to equal Gulliver).

2. Divide students into pairs. Their problem:
   -Figure out what measurements you would need for his set of clothes.
   -Devise a formula for finding these measurements in relation to his thumb and wrist sizes. (Use metrics!)

3. The Lilliputians also had to figure out how much food and water Gulliver required. Devise a formula for finding this amount.

VARIATIONS

Have students write stories involving mathematical computation. (Science fiction lends itself to this.)

SKILLS BEING DEVELOPED

Application

CONTRIBUTED BY

Sharon Young, 1977 ECA Conference, ECA Consultant, Boulder, Colorado.

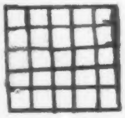
PENTOMINOES

SUBJECT AREA

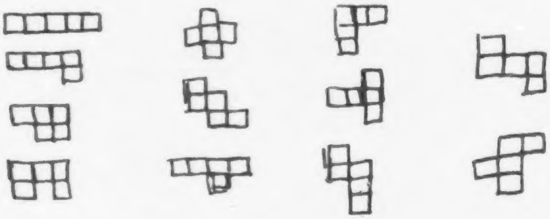
Math, All

MATERIALS

Square gameboard can be constructed of 25 one-inch squares (5 rows of 5).



Pentomino pieces may be cut from placemats or laiminated cardboard.



OBJECTIVES

Students will be able to envision how pieces fit together to form a square.

DESCRIPTION

The object of this game is to fill in all squares on gameboard with given pieces.

ACTIVITIES

The 12 pentomino pieces are spread out on the table. The two players take turns picking the pieces they want to play with (one player picks a piece, then the other picks one, and so on.) The person who picks the last piece starts play.

Each player in turn places one of his pieces on the board in in any location so long as it is covering five squares on the board. When no more pieces can be placed on the board, the winner is the one who put the last piece on the board. If both players are able to play all of their pieces, the one who goes out first wins. Pieces may not overlap.

VARIATIONS

Students can play to help each other complete the square if competition is not desireable.

SKILLS BEING DEVELOPED

Analysis, application, synthesis

CONTRIBUTED BY

Sheila Kellenbarger, Pound Junior High School; Dorothy Johnson, Mickle Junior High School; both of Lincoln, Nebraska.

ARABIC TIC TAC TOE

SUBJECT AREA

Math

OBJECTIVES

Students will be able to formulate offensive as well as defensive strategies while playing game.

DESCRIPTION

This is a more elaborate form of tic-tac-toe.

ACTIVITIES

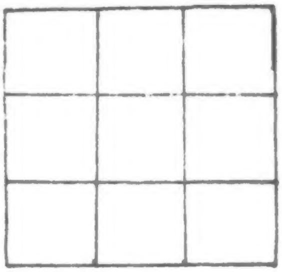
1. Find a partner.
2. The object is to have three of the same colored pieces in a straight line with pieces only being placed at intersections of the black lines. You should attempt to place your pieces in a straight line while blocking opponent from doing same. (The Center intersection may also be used.)
3. How to Play:
   A. Player "A" places one piece on an intersection.
   B. Player "B" then places one of his pieces in a straight line. (Diagonals Do Not Count). Player "A" then moves any of his pieces to a new intersection. Player "B" then follows. This continues until one player has three pieces in a straight line.

SKILLS BEING DEVELOPED

Analysis, application, synthesis.

CONTRIBUTED BY

Unknown.



SUBJECT AREA

Math

OBJECTIVES

Students will be able to broaden their concept of mathematics through independent reading in mathematics.

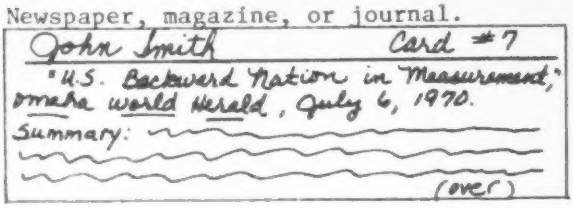
DESCRIPTION

Here's what one math teacher uses to involve students in the library.

ACTIVITIES

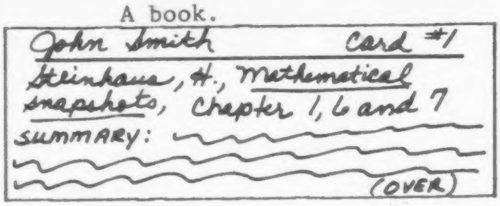
In addition to the normal textbook reading, each student will be expected to do some independent reading in the area of mathematics. A total of eight reports are required and one report will be due the first part of each month during the school year. The readings may be from periodicals (magazines or journals), newspapers, booklets, pamphlets, or books (one chapter will be sufficient when using a book). In respect to restrictions, at least four of the reports must be from books with a limit of one report per book, encylopedias may not be used more than once during the year, and the reports shall be placed on 3x5 index cards. When making your reports, please refer to the samples listed below.

Newspaper, magazine, or journal.



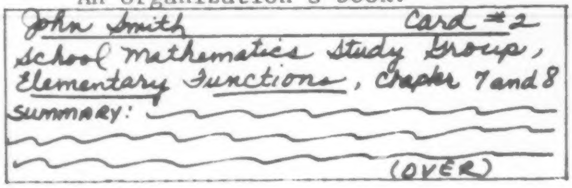
John Smith Card #7
"U.S. Backward Nation in Measurement," Omaha World Herald, July 6, 1970.
Summary:
(over)

A book.



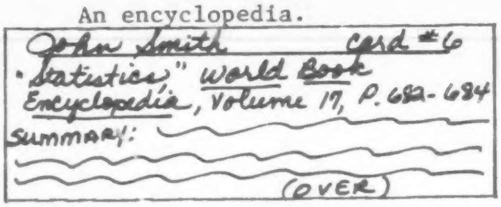
John Smith Card #1
Steinhaus, H., Mathematical snapshots, Chapter 1, 6 and 7
SUMMARY:
(OVER)

An organization's book.



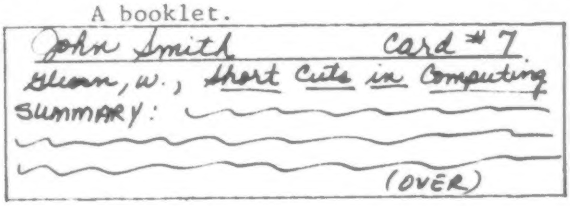
John Smith Card #2
School Mathematics Study Group, Elementary Functions, Chapter 7 and 8
SUMMARY:
(OVER)

An encyclopedia.



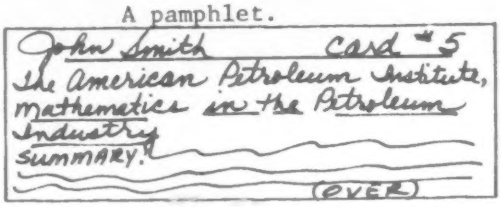
John Smith Card #6
"Statistics" World Book Encyclopedia, Volume 17, P. 682-684
SUMMARY:
(OVER)

A booklet.



John Smith Card #7
Glenn, W., Short Cuts in Computing
SUMMARY:
(OVER)

A pamphlet.



John Smith Card #5
The American Petroleum Institute, Mathematics in the Petroleum Industry
SUMMARY:
(OVER)

NOTE: The back side of all cards should be completed with the last two or three lines being used for personal comments.

SKILLS BEING DEVELOPED

Synthesis, application.

CONTRIBUTED BY

James H. Fraser, Hebron Public Schools, Hebron, Nebraska 68370.

WILLIAMS' GEMS

SUBJECT AREA

Math

DESCRIPTION

Below are a few ideas for activities from Frank Williams' Classroom Ideas for Encouraging Thinking and Feeling, D.O.K. Publishers (full information below). Each specifies which element of creativity is being developed-first its cognitive component, then its affective component. Teaching strategies are also specified.

ACTIVITIES

To Encourage: Curiosity
Using: Strategies No. 3 - Analogies
No. 16- Creative listening skill

One teacher discussed how music depends upon arithmetic. One specific example was how the division of notes is related to fractions. Recordings of different types of music and different rhythms and provoked a great deal of enthusiasm and sensitivity to the idea that time (beat) is to music as division is to arithmetic. This understanding of the principle of the division of musical notes was a good beginning for subsequent arithmetic lesson on fractions.

****

To Encourage: Flexible thinking
Using: Strategies No. 7 - Examples of change
No. 8 - Organized random search

The class listed many different things that the number 21 meant to them. Some responses included:

Able to vote - "free, white and 21"
A secret agent number
Number of a baseball play
Name of a quiz show for adults

The teacher then discussed with the class how various numbers have assumed implied significance in our society, e.e., 13 is unlucky, as Friday the 13th; 7 and 11 are lucky, as in "7 come 11"; 57 suggests a conglomeration or mixture as Heinze 57 variety; etc. The teacher asked the class to think of and list as many different numbers as possible having some other implied meaning. Following this a discussion ensued concerning the wide spread acceptance of such implied meanings and how such numerical associations can become fixated by habit.

****

To Encourage: Flexible and original thinking: Imagination
Using: Strategies No. 8 - Organized random search
No. 11- Intuitive expression
No. 18- Visualization skill

The class made fraction wheels from different colored construction paper, each fraction being a different color. The following fractions and colors were used: 1/8 - red, 1/6 - blue, 1/2 - yellow, 1/4 - green, 1/3 - pink, 1/12 - purple, 1/5 - orange, 1/10 - black. These colored wheels were then cut into their fractional parts. As an arithmetic exercise these parts were arranged in as many different combinations as possible to complete a whole wheel by adding or overlapping them. The children were then asked to use the colored fractional pieces to plan and arrange an interesting and unusual pattern or design with as many pieces as they wished. Then the pieces were pasted onto a sheet of 9" x 12" manilla paper. Each child was then asked to think of some unusual name for the abstraction that would represent his own feeling.

****

To Encourage: Complexity and risk taking
Using: Strategies No. 8 - Organized random search
No. 10- Tolerance for ambiguity

The teacher's objective was to involve the class in seeking many alternatives and combinations of the four mathematical processes. She requested that by using all four processes and as many numbers as they wished they should design a complex problem whose answer would be 27. Results included problems containing as many as 5 to 20 numbers. Some examples were:

$$3 + 5 - 2 \times 50 - 30 - 20 \div 50 + 24 - 2 = 27$$

$$50 - 40 \div 2 + 3 + 5 \times 10 - 40 + 50 \div 7 + 13 - 24 \times 3 = 27$$

One valuable outcome of this idea was that the children set their own goals for designing complex problems resulting in a great deal of individual differences among the class.

****

To Encourage: Original thinking and curiosity
Using: Strategies No. 3 - analogies
No. 9 - Skills of search
No. 14- Evaluate situations

The questions by this teacher were: "What if our country had two separate and distinct measuring systems instead of one common system? What advantages or disadvantages would occur? What problems would result?" In attempts to answer these questions the class was led to the awareness of differences between the existing English and Metric systems of measurement. Similarities between the bases of these two systems of measurement and different base systems of mathematics werepointed out by the teacher. After students realized the tremendous problems resulting from having two measurement systems they were to design one new common system of measures which would be simple yet useful to all people. Some of their ideas for the design of this new system of measurement came from a study of the development of the metric system by Legrange.

SKILLS BEING DEVELOPED

Below is a list of Frank Williams' teaching model:

PUPIL BEHAVIORS

Cognitive	Affective
Fluent thinking	Curiosity (Willingness)
Flexible thinking	Risk Taking (Courage)
Original thinking	Complexity (Challenge)
Elaborative thinking	Imagination (Intuition)

TEACHER BEHAVIORS

1. Paradoxes
2. Attributes
3. Analogies
4. Discrepancies
5. Provocative Questions
6. Examples of Change
7. Examples of Habit
8. Organized Random Search
9. Skills of Search
10. Tolerance for Ambiguity
11. Intuitive Expression
12. Adjustment to Development
13. Study Creative People & Process
14. Evaluate Situations
15. Creative Reading Skill
16. Creative Listening Skill
17. Creative Writing Skill
18. Visualization Skill

CONTRIBUTED BY

Reprinted with permission of D.O.K. Publishers Inc., 71 Radcliffe Road, Buffalo, New York 14214. From Classroom Ideas for Encouraging Thinking and Feeling (1970, $7.50) - Frank E. Williams.

MEEKER CLASSIFICATION

SUBJECT AREA

Math

MATERIALS

Pencil and paper.

OBJECTIVES

The students will be able to develop the ability to group items of symbolic information in different ways.

DESCRIPTION

Here are some ideas to promote creativity and flexibility with numbers.

ACTIVITIES

1. Students will form numerals by using each of the nine digits once and only once.
    - A. In what order can you place the nine digits and subtract the nine digits and arrive at an answer with all nine digits represented?
    - B. By what numerals can you multiply the nine digits and arrive at a product that contains all the nine digits once and only once?
    - C. Divide the nine digits by 9; is it divisible by nine? Does it make any difference what order the nine digits are arranged?
2. Students are to find arithmetic problems in which each of the nine digits is used once and only once.
    - A. Can you use the nine digits and write an equation using addition, and use all the digits once and only once (including the sum).
    - B. Now try and apply multiplication to the same task.
    - C. Can you do the same with subtraction?
    - D. Try it with a fraction.

SKILLS BEING DEVELOPED

Divergent production of symbolic classifications.

CONTRIBUTED BY

Reprinted with permission from SOI Abilities Workbook-Divergent Production, Mary Meeker, SOI Institute, 214 Main, El Segundo, California 90245.

TOPICS FOR STUDENTS

SUBJECT AREA

Math

DESCRIPTION

Below is a list of topics which can be pursued by students interested in math.

ACTIVITIES

Individualized activities may be built around the following topics:

Tessellations
Probability
Number Bases
Unusual Numbers-Googal-Perfect Numbers-Prime Twins
Soap-Film Mathematics
Topology-Networks-Euler Formula-Mobius Strip
Mobiles
Golden Section
Polyominoies (Pentominoes 2 and 3 dimensions)
Thinking Skills
Statistics-Graphing-Inference
Calculators
String Sculpture
Tangrams
Seeing Shapes (space perception and spatial relationships)
Paper Folding
Paper Cutting
Making Models
Game Puzzles-Mastermind-Manacala-Shotzee-etc.
Attribute Games
Geoboard (Pike's Theorem-Maximum Area and Minimum Perimeter, etc.)
Mira
Construction Design
Patterns
Fibonacci Sequence
Proportions: Measure height of buildings, flagpoles, etc.
Area of Irregular Shapes
Symmetry
Napier's Rods
Geometric Constructions
Four Color Problem

SKILLS BEING DEVELOPED

Various

CONTRIBUTED BY

Don Niemann, Math Consultant, Nebraska Department of Education.

MATHEMATICAL PROBLEMS

The following pages include various math problems for classroom mind-stretching.

MATHEMATICAL PROBLEMS

SUBJECT AREA

Math

OBJECTIVES

Various.

DESCRIPTION

Below are several activities which may be used as part of the regular curriculum or as independent problem-solving activities. Some have the answers in parentheses, others do not.

ACTIVITIES

1. One of the greatest mathematicians of all times was Diophantus of Alexandria (ca 300 AD). Often, as is the case below, the solution is restricted to integers. This is one of Diophantus' problems which appears in his Arithmetica: In a right triangle ABC, right angled at C, A bisects angle A. Find the set of smallest integers for AB, AD, AC, BD, DC such that DC:CA:AD = 3:4:5.

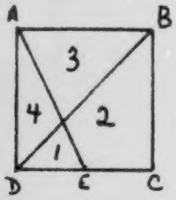
2. Seven men and a monkey were shipwrecked on a desert island. They spent the first day gathering a great pile of coconuts which they agreed to divide equally the next morning. The first sailor thought he would make sure of his share, and got up secretly in the night, divided the nuts into seven equal piles, and finding an extra one left, gave it to the monkey. Then, concealing his pile, he heaped the other six piles into one and went back to sleep. Shortly afterward, a second man awakened and did what the first had done: He made seven equal piles, giving an odd one to the monkey, concealed his own pile, heaped the other six piles together, and went back to sleep. Next the third man awoke and did the same: Then the fourth, fifth, sixth men all did likewise: and finally, so did the seventh. In the morning, they did as they had planned, and this time the coconuts came out even in seven equal shares with no extra for the monkey. What is the minimum number of coconuts that could have been in the original pile?

3. Brickmaker, I am in a hurry to erect this house. Today is cloudless, and I do not require many more bricks, for I have all I want but three hundred. Thou alone in one day couldst make as many, but thy son left off working when he had finished two hundred, and thy son-in-law when he had made two hundred and fifty. Working all together, in how many days can you make these?

4. I am a brazen lion; my spouts are my two eyes, my mouth, and the flat of my right foot. My right eye fills a jar in two days (1 day = 12 hours), my left eye in three, and my foot in four. My mouth is capable of filling it in six hours. Tell me how long all four together will take to fill it.

5. Make a corwn of gold, copper, tin, and iron weighing 60 minae; gold and copper shall be two thirds of it; gold and tin three fourths of it; and gold and iron three fifths of it; find the weights of gold, copper, tin, and iron required.

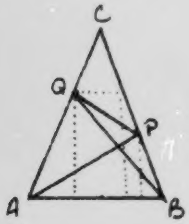
6.



Given: Square ABCD; Diagonal BD; E is the midpoint of DC.

Find: The ration of the areas 1:2:3:4.

7.



Given: Triangle ABC is isosceles, AC is congruent to CB. Angle C = 30°

Find: The measure of angle PQB.

8. The Monkey Problem: A rope ran over a pulley; at one end was a monkey, at the other end a weight. The two remained in quilibrium. The weight of the rope was 4 oz. per foot, and the ages of the monkey and the monkey's mother amounted to four years. The weight of the monkey was as many pounds as the monkey's mother was years old, and the weight of the weight and the weight of the rope were together half as much again as the weight of the monkey.

The weight of the weight exceeded the weight of the rope by as many pounds as the monkey was years old when the monkey's mother was twice as old as the monkey's brother was when the monkey's mother was half as old as the monkey's brother will be when the monkey's brother is three times as old as the monkey's mother was when the monkey's mother was three times as old as the monkey was in paragraph one.

The monkey's mother was twice as old as the monkey was when the monkey's mother was half as old as the monkey will be when the monkey is three times as old as the monkey's mother was when the monkey's mother was three times as old as the monkey was in paragrpah one.

The age of the monkey's mother exceeded the age of the monkey's brother by the same amount as the age of the monkey's brother exceeded the age of the monkey.

What was the length of the rope?

9. Explain the following paradox: $3 > 2$

multiply both sides by log (½) $3\log(\tfrac{1}{2}) > 2\log(\tfrac{1}{2})$

$$\log(\tfrac{1}{2})^3 > \log(\tfrac{1}{2})^2$$

$$(\tfrac{1}{2})^3 > (\tfrac{1}{2})^2$$

$$1/8 > 1/4$$

10. Explain the following paradox: $\sqrt{a}\,\sqrt{b} = \sqrt{ab}$

let $a = b = -1$

$$\sqrt{-1}\,\sqrt{-1} = \sqrt{(-1)\,(-1)}$$

$$\sqrt{-1}\,\sqrt{-1} = \sqrt{1}$$

by definition $\sqrt{-1}\,\sqrt{-1} = -1$

$$-1 = 1$$

11. Consider the integral

$$1 = \int \sin x \cos x\, ds = \int \sin x(\cos x\, dx) \quad \text{or} \quad 1 = \int \cos x(\sin x\, ds)$$

$$= \int \sin x\, d(\sin x) \qquad = -\int \cos x(d\cos x)$$

$$= \frac{\sin^2 x}{2} \qquad = \frac{-\cos^2 x}{2}$$

$$\sin^2 x = \cos^2 x$$

and $\sin^2 x + \cos^2 x = 0$

but we know that $\sin^2 x + \cos^2 x = 1$

What is wrong?

12. Patterns: Take a square of paper, fold it in half lengthwise from right to left. Rotate the resulting rectangle 90° clockwise and fold in half from right to left. Rotate the resulting square 90° clockwise, fold in half--etc.

Given the nth operation, find a general formula in terms of n for:

A. The number of fold lines.
B. The number of intersection points.
C. The resulting geometric shape.
D. The area of the geometric shape.

13. Draw a Dominoe:

Place a number from zero through 9 on each side of the divide line.
Multiply the number on the left side by 5
Add 8 to the resulting product
Multiply the sum by 2
Add the number found on the right side to the new product
Subtract 16 from the answer
(Your answer is the numerals you placed on the left and right of the divide line)

14. Pick a Number:

Add 3
Multiply the sum by 2
Subtract 4 from the product
Divide the difference by 2
Subtract the number you started with from the quotient
(The answer will be 1)

15. Choose a Number: (good for Halloween or a particular Friday)
(Note: the original number must be more than 6)

Add 11
Multiply by 6
Subtract 3
Divide by 3
Subtract 6 less than the original number
Subtract 1 more than the original number
Divide by 2
(The answer will be 13)

16. Write Your House Number:

Double it
Add 5
Multiply by 50
Add your age
Add 365
Subtract 615
(The answer will contain your house number and your age)

17. Take a Number:

Multiply by 10
Subtract the number you started with
(Your answer will be a multiple of nine)

18. Pick A Number:

Add 22
Multiply by 5
Subtract 25
Divide by 5
Subtract 17
(The answer will be the number you started with)

19. Decide on a Number:

Multiply by 2
Add 5
Multiply by 50
Subtract 365
Add a number of your choice
Add 115
(The answer will contain the number you started with and the number you were allowed to add)

20. Write the Number of the Month of Your Birthday:

Multiply by 2
Add 5
Multiply by 50
Add in the number of your birthday (the day)
Subtract 365 (Stop with students at this point)
Teacher: add 115 mentally to each student's final answer and you will know their birthday
Note: (If a student has a birthday from January 1 to January 14, negative numbers will be involved.)

21. Write the Number of the Month in Which You Were Born:

Multiply by 5
Now place a three to the right of the ones place
Add 12
Multiply by 2
Add the day of the month on which you were born
Subtract 30 from the answer
(Your answer contains the day and month of birth)

22. Roll a Pair of Dice:

Multiply the number of one die by 5
Add 7
Multiply by 2
Add the number found on the other die
Subtract 14 from the answer
(The answer: The digit in the ten's place is the number on one die and the digit in the one's place is the number on the other die)

23. 7 - 11 - 13:

Write down any three digits and then write them again in the same order to make a six-digit number. For example: if you wrote 123, your number would be 123,123.

Divide your number by 7. You will find that it divides exactly without a remainder.

Take the result and divide by 11. Again there won't be a remainder.

Divide the last result by 13. Does your result look familiar?

Source for problems 13-23: Diane Dudley, Nebraska Department of Education.

24. Number Please: Determine the correct numbers in the left column and multiply, divide, add or subtract them as indicated. Then find a matching item in the right column. For example: Checkerboard squares (64) - Presidents on Mt. Rushmore (4) = Seconds in a minute (60).

A. The senses + The Great Lakes
B. Wisdom teeth x Each state's Senators
C. Baseball team + Tones in an octave
D. Ounces in a pound - The Muses
E. Legs of a bovine + Eyes of a cyclops
F. Dozen and a half - Zodiac signs

G. Known planets ÷ Feet in a yard
H. Snow White's dwarfs ÷ "The ___ Seas"
I. Degree in a circle ÷ Degree in a right angle
J. Octogenarian ÷ Pecks in a bushel
K. Baker's dozen + Faces of Janus
L. Disciples x Gentlemen of Verona
M. Alphabet's letters x Dots in a colon
N. Bluebeard's wives x Supreme Court members
O. Bits in a half dollar x Days in a week
P. "Dinner at ____" + The Rs

(1) Weeks in a year
(2) Hexagon sides
(3) Lucky number
(4) 6 x 6 backward
(5) The Commandments
(6) Blackbirds baked in a pie
(7) Octopus arms
(8) Days February hath
(9) The Fates
(10) Football team
(11) Apocalypse Horsemen
(12) Book by Booth Tarkington
(13) Men on dead man's chest
(14) Double decade
(15) Points in a star
(16) Wilson's points

Answers:
A. (5) Ten
B. (7) Eight
C. (12) Seventeen
D. (3) Seven
E. (15) Five
F. (2) Six
G. (9) Three
H. (16) 14
I. (11) Four
J. (14) 20
K. (13) 15
L. (6) 24
M. (1) 52
N. (4) 63
O. (8) 28
P. (10) 11

25. Sum Fun:

Which is the greater, that of the figures on the left, or on the right?

987654321	123456789
87654321	12345678
7654321	1234567
654321	123456
54321	12345
4321	1234
321	123
21	12
1	1

(Answer: Believe it or not, they both add up to the same -- 1,083,676,269.)

26. Areas of Prisms:

___cm^2 A. Find the lateral area of a right triangular prism if its height is 8 cm and its base is an equilateral triangle with sides 6 cm long.
___cm^2 B. Find the total area of the prism in problem A.
___cm^2 C. Find the lateral area of a cube with an edge 7 cm long.
___cm^2 D. Find the total area of the prism in problem C.
___cm^2 E. The base of a right prism is a regular hexagon with sides 4 cm long and height 5 cm. Find the lateral area.
___cm^2 F. Find the total area of the prism in problem E.
___m^2 G. Find the lateral area of a right rectangular prism if its length is $2\sqrt{3}$ m, its width is $\sqrt{3}$ m, and its altitude is 5 m.
___m^2 H. Find the total area of the prism in problem G.
___cm^2 I. A right prism of height 10 cm has a base bounded by a rhombus whose diagonals are 6 cm and 8 cm long. Find the lateral area.
___cm^2 J. Find the total area of the prism in problem I.
___cm^2 K. In the given right prism the bases are isosceles trapezoids. (The altitude of each trapezoid is 5.) Find the lateral area.
___cm^2 L. Find the total area of the prism in problem K.

Source: Patterns, Midwest Publications.

27. If you go to bed at 8:00 at night and set the alarm for 9:00 the next morning, how many hours of sleep will you get?

28. If you divide 30 by ½ and add 10, how much will you have?

29. If you take two apples from three, how many will you have?

30. Two men played five games of checkers. Each won the same number of games. How can this be if there is no tie in checkers.

Source for Problems 27-30: Don Niemann, Department of Education, Lincoln, Nebraska.

SUBJECT AREA

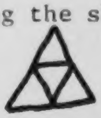
Math

DESCRIPTION

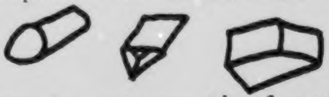
Ideas for activities.

ACTIVITIES

1. Compare your height to the length of your shadow. Upon completion of this task, the students may then find the height of ten large things by measuring their shadows.
2. Find ten cylinders in the neighborhood where you live. Find three ways to measure each one. Compare your measurements on a graph.
3. Can you build a basic shape that changes in size? Start by combining small squares, triangles, or rectangles from the set of tiles... compare measurements among the shapes you have made.



4. Cut five pieces of construction paper, each six units long and four units wide. Fold and tape them so that they form a set of tubes with 1, 3, 4, and 5 corners. Compare the amounts that the paper tubes hold. Can you explain the reason for the results?



5. Use your hand span to measure the length of ten objects in the room. Guess the length of each object in spans before you measure it. Compare your results with someone else's. Why are they different?
6. Compare the weight of six things to the weight of an equal amount of water. What rules can you make about the wieght of things and what they do in water?
7. Measure any object in your classroom. Find all of its dimensions, its area, and volume, if possible. Construct a scales model of this object which is at least ten times larger or smaller than the original. What has happened to the surface area or volume of your model compared to the original?
8. Use string to measure parts of your body. Compare the pieces of string. Make a record of your work.
9. How much do your classmates weigh? Find their weight in kilograms. Compare the weights on a graph.
10. This unit of length >————————< does not have a name. Invent a name for it.

11. How many normal breaths does it take to inflate a balloon? How much air do you breathe in five minutes? Make a graph to compare your results with the class.

12. Using a geoboard make arrays that have different geometric shapes. Make a chart of the patterns you have made. Compare the patterns. What rules can you discover?

13. Make a large model of a small object. How much larger is the model than the real object?

CONTRIBUTED BY

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THE FRISBEE

In the late 1940s, students in Connecticut began playing catch with pie tins from the Frisbie Baking Co. Soon the fad reached Los Angeles where Fred Morrison, a building inspector and part-time carnival barker entertained crowds by sailing pie tins overhead.

Morrison pretended he was using an invisible string to guide the tins. He'd sell a string for a dollar and throw in a tin for free.

A few years later plastic Frisbees filled the skies of America.

Science Activities

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NATURE RECIPES

SUBJECT AREA

Botany

MATERIALS

Identification books:

Nebraska Wild Flowers, Robert C. Lommasson, University of Nebraska Press.

Outdoor Survival Skills, Larry Dean Olsen, Brigham Young University Press.

Field Guide to Edible Wild Plants, Bradford Angier, Stackpole Books.

Stalking the Wild Asparagus, Euell Gibbons.

Collecting sacks, home economics room.

OBJECTIVES

1. To incorporate other subject areas with Biology.
2. To give the students a chance to involve all of their senses with a learning experience.
3. To give the students confidence in identifying wild plants.

DESCRIPTION

Botany as a unit of study in Biology often tends to be rather boring. This activity is a way to make botany more meaningful and at the same time give the kids a chance to experiment with recipes and cooking. Care should be taken when gathering wild foods so that an area is not over harvested or that a student doesn't do himself in by lunching on the wrong plant. If care is taken the unit can be exciting and not dangerous.

ACTIVITIES

Introduce the unit by having the students try some types of wild food already prepared. Make sure the taste doesn't turn them off. If the unit is started in the fall I suggest using ground cherries, wild plums, or black walnuts. A spring unit is more difficult, due to the absence of fruits, but morell mushrooms can be used with much success. Once you have their interest you can move on to other plant types that have more unusual but not disagreeable tastes. I assign pairs of students with a plant species, have them research the recipe possibilities, try it out themselves, and then have them bring a prepared dish to school for all members of the class to try and comment on. At the end of the unit we have a wild food meal with several prepared dishes. (Make sure you know how to identify your material. I will list several sources that can be used to get you started. Check the area around your community out before the unit starts to see what is available. It is also crucial to know when things are in season.)

VARIATIONS

Material on plant form and structure can be incorporated into this unit.

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation.

CONTRIBUTED BY

Jim Landon, Instructor of Science, Seward High School, Seward, Nebraska.

SOUTHERN EXPOSURE

SUBJECT AREA

Ecology, Botany

MATERIALS

Meter sticks, thermometers, marker stakes.

OBJECTIVES

1. To get the class outside.
2. To give the students a chance to observe the interplay between biotic and abiotic components in an ecosystem.
3. To give students a chance to work with collecting and analyzing data in the field.

DESCRIPTION

This exercise can be run anywhere there is a wall with a southern exposure. The position of the sun in Fall, Winter, and Spring causes a shadow effect from walls that face north that prevents vegetation within the shadow from maturing at the same rate as vegetation against a south-facing wall. The abiotic factors of temperature and light control the rate of growth and maturation.

ACTIVITIES

Have the students stake out two one meter square plots, one for each area. Each area can then be studied for species density, growth rate, temperature associated animals, and any other factors that may help them solve the problem of how the two areas differ and why. I have found that the study works out best if conducted over about a two week period. It is not necessary to take data every day. Results of the study can then be written up in proper scientific form -- purpose, procedure, data, conclusion -- to give students a chance to practice organizing data and evaluating their results.

SKILLS BEING DEVELOPED

Knowledge, comprhension, analysis, application, evaluation.

CONTRIBUTED BY

Jim Landon, Instructor of Science, Seward High School, Seward, Nebraska.

VEGETATION ANALIZATION

SUBJECT AREA

Botany, Plant Ecology

MATERIALS

Meter sticks

OBJECTIVES

To show students how to quickly and accurately estimate plant species densities in a natural community.

DESCRIPTION

It is often desirable in the study of ecosystems to be able to account for the kinds of plants present and their relative abundance. This exercise is designed to accomplish both with a minimum of problems. For this exercise to work the students must be able to identify the plants they are going to encounter. They also must know how large an area of the ecosystem to sample for accurate results. A species area curve can be used to determine the number of sample plots needed to analyze the vegetation. Determine one as follows: Randomly select sample areas of one meter square and record the name of each species found within the boundaries of the square meter. After all species are accounted for randomly select another square meter and tally all new species not found in the first sample. Repeat this procedure until no new species are found. The number of square meters it takes to reach this point of negative return is the number to be sampled for species density.

ACTIVITIES

Select an area for study that offers a variety of plant life. On the first day have the students collect and identify as many different plants from the area as possible. On the second day have them figure for a species area curve to determine how many square meters of the area will have to be sampled to get an accurate accounting. On the third day they can set up their sample areas in a random fashion and count all plants in each sample area. After all data is taken, it is easy to account for individual species abundance as a percentage per square meter.

VARIATIONS

This procedure can be modified for the purpose of determining densities for individual species. If this is the desired result you can forgo the species area curve and just count several square meters accounting for the desired species and expressing it as an average per square meter.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application.

CONTRIBUTED BY

Jim Landon, Instructor of Science, Seward High School, Seward, Nebraska.

FLORA ID

SUBJECT AREA

Botany

MATERIALS

Plant press, cardboard blotters, herbarium paper, labels, white glue, identification keys, field notebook, newspaper, straps.

OBJECTIVES

1. To have students develop collecting and identification skills.
2. To have students master herbarium techniques.
3. To familiarize students with native flora of various ecosystems.
4. To enable students to handle field ecology work with greater ease (plant identification and plant census work)

DESCRIPTION

This activity is designed to help students gain a working knowledge of plant collecting and herbarium techniques. It is desirable that students be able to know how to identify plants in the field with speed, ease, and accuracy. By having them collect, identify, and prepare specimens they rapidly develop this skill. Plant presses, straps, and blotters (cardboard) can be either purchased or made. The mounting paper, labels, etc. are best purchased from a biology supply house. Presses can be easily made by nailing five wood strips across an equal number of strips to give you an 11" x 17" grid. Corigates can be cut to the same dimentions.

ACTIVITIES

Students can be required to collect any number of species (mine must collect and identify at least forty). For best results specimens should be pressed in the field. Wilting tends to make many look shabby before they can be pressed. Once a specimen has been collected it is arranged between a folded sheet of newspaper, given a field number and added to the press. The field number is entered in the field notebook along with the date, locality, description of plant and flowers, soil type, slope, etc. The more information added to the notebook the greater the value of the specimen in the lab. Once the specimen has dried it can be identified by using any of a number of key books. Dried specimens are then mounted on herbarium paper and given permanent lables. I have found that the fastest way to glue a specimen is to take a glass sheet of appropriate size, brush on a layer of glue and press the plant onto it. The plant can then be transferred to the herbarium sheet and allowed to dry. Dried prepared sheets can then be laminated to increase durability. These prepared specimens can be used for numerous other activities. Units on edible wild plants, natural dyes, taxonomy, population density etc. can be taught utilizing the prepared specimens.

Good Identification Books:

1. *Nebraska Wild Flowers*, Robert C. Lommasson.
2. *Nebraska Weeds*, State Department of Agriculture, Weed Division.

SKILLS BEING DEVELOPED

Analysis, application, evaluation.

CONTRIBUTED BY

Jim Landon, Instructor of Science, Seward High School, Seward, Nebraska.

DNA MODEL

SUBJECT AREA

Science

OBJECTIVE

Students will obtain a better understanding of the strucutre of the DNA molecule and possibly develop interest in further investigation.

DESCRIPTION

Use this construction of a DNA Model activity as a possible springboard for student individual activities.

ACTIVITIES

1. DNA, or deoxyribonucleic acid if you prefer, is the building block of all known life. Yet many of us know very little about this mysterious molecule.

2. Help interested students find articles and pictures of the DNA phenomenon. A good place to start is an article, "Exploring the New Biology," National Geographic, September, 1976.

3. Then, using either gumdrops and straws, Tinker Toys, or plastic foam balls and doweling rods, build a model of the DNA double helix. If you can't obtain materials to make a model, suggest a large drawing of the life-building molecule.

VARIATIONS

Students could prepare a written or taped account of the nature and significance of DNA and display it near the project for others to benefit.

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation

CONTRIBUTED BY

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THE BRONX HIGH SCHOOL OF SCIENCE
MODEL PROGRAM FOR DEVELOPING CREATIVITY IN SCIENCE
VINCENT GALASSO
TENTH YEAR BIOLOGY - LESSON PLANS

PROBLEM: How can we differentiate between living and non-living things? or What characteristics do living things have in common?

MATERIALS: Mercury, 10% Nitric Acid, Potassium Dichromate, Petri Dish, Overhead projector.

NOTE TO TEACHER: A drop of mercury placed into 10% nitric acid with a crystal of potassium dichromate will simulate movement, ingestion and other functions carried out by simple organisms. These changes are actually due to changes in surface characteristics of the mercury. When this is shown in a Petri dish on an overhead projector, students will assume that this is a simple living organism. This is an ideal motivation for a discussion on the characteristics of living things.

MOTIVATION: The Viking lander sampled soil on Mars. One reason was to determine whether there is life on Mars. We will simulate (meaning?) one of their experiments:
Scoop up material to be tested (drop of mercury)
Place into water-like medium (nitric acid in Petri dish on overhead projector)
Add nutritive substance (potassium dichromate cyrstal)
Observe: "eating," "excreting," "moving," "dividing or reproducing"
What are these processes called? life functions

PROBLEM: How can we differentiate between living and non-living things?

DEVELOPMENT: Q. Discussion - Is this living or non-living?
A. Actually this is a mercury drop (Hg Amoeba)
Q. What functions do living organisms carry out that this did not? Consider one life function - (for example) Nutrition (take in raw materials, process them and make them usable for other activities)
Q. In chemical terms, what materials do organisms ingest?
A. Large organic molecules (meaning?)
Q. Why does the organism need large organic molecules?
A. As a source of energy and building blocks.
Q. How is energy defined?
A. Ability to do work.
Q. What kinds of work are done in living organisms?
A. Muscles (movement), growth, thinking, bioluminescence, etc.
Q. What kinds of energy are involved?
A. Mechanical, chemical, electrical.
Q. Where does an organism get the energy?
A. Food - large organic molecules broken down. This only yields chemical energy.
Q. Therefore, what has the organism doen to the chemical energy?
A. Transformed it.

In order to do this, the organism carries on life functions.

In general terms, living things are transformers of energy.

We can add other criteria:

- biosynthesis
- homeostasis (in order to maintain its own stability and structure)
- reproduction (in order to maintain the species)

SUMMARY: Can we draw any conclusions?

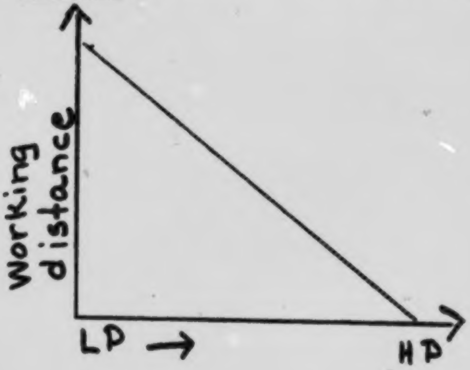
Is the "mercury amoeba" living?
Is a virus living?
Is someone on total life support systems in a hospital living?
Can we make any hard and fast rules?
What criteria are we using to determine "living"? (transplants, etc.)
Is there life on Mars? (note-there is an implicit assumption made in the Viking experiments that Martian life would be chemically the same as Earth life.)

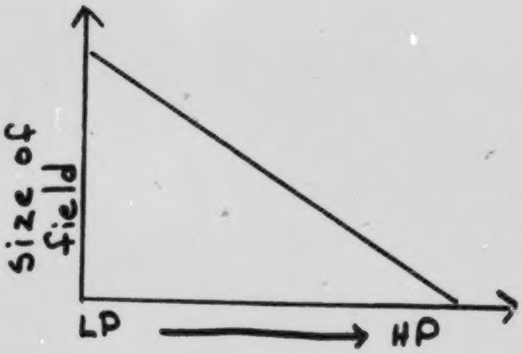
LESSON 1-2

PROBLEM: How do biologists study living things? What is their most important tool? For additional information consult BSCS-Biological Science: An Inquiry into Life, published by Harcourt, Brace, Jovanovich, New York. Yellow Version, Lab Manual, exercise 3.1, 3.2 and 3.9.

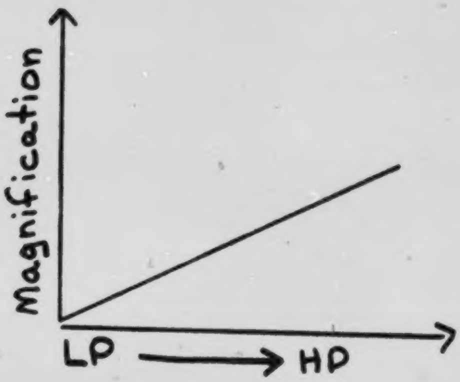
Use oil immersion lens to examine bacterial slides.

SUMMARY: Discuss inverse relationships as follows:





but



Discuss how to make graphs (X axis-independent variable, and X axis-dependent variable)

ASSIGNMENT on measurement-refernce:

Klinckman, Evelyn, (Supervisor), BSCS, Biology Teachers Handbook, 2nd. ed., inv. 5, p. 150, John Wiley, N.Y., 1970.

LESSON 1-3

PROBLEM: What does the microscope reveal about the structure of living things?

MATERIALS: 1. Tissue-onion, Elodea, muscle, cheek cells, cork. 2. Lab sheets. 3. Microtome.

MOTIVATION: We know how a microscope works. What is the next logical question?

PROBLEM: What does the microscope reveal about the structure of living things?

DEVELOPMENT: Since the microscope is a light microscope, and light must pass through these tissues, how must they be prepared for viewing?

Procedure: See lab exercise #3

Follow up: Compare shapes of cells as to structure and function. Show a chart of typical cells. What accounts for shape? Cells have evolved so that they are specialized to perform different functions. Observe muscle cell on chart. How would the muscle cells of man, frog, and insect compare? (same). How would you account for this? (similar function). How do you explain that the shape is the same generation after generation? (heredity is controlled by the nucleus). Derive a definition of "tissue."

SUMMARY: 1. As a result of viewing all types of living tissues under the microscope, what theory have scientists been able to formulate? (Cell Theory). 2. Where did the first cell come from? (not meant to be answered in full at this point. Keep discussion simple).

HOMEWORK: 1. What are the four important ideas included in the Cell Theory? 2. Which scientists contributed to the development of this concept? 3. What are some exceptions to the cell doctrine?

LESSON 1-4

PROBLEM: How does the structure of the slime mold compare to the cells that we have seen and the theory that we have established?

MATERIALS: Slime mold lab sheet.

PROCEDURE: Daily series of observations on slime mold. Questions to keep in mind: 1. Why is this organism unique? 2. What questions remain unanswered after doing this experiment? 3. What further experiments might be done using this organism as the experimental organism? Write a suggested procedure.

NOTES TO THE TEACHER: Slime mold-Myxomycophyta.

Discuss Dictostyleum discordum and Myxococcus xanthus.

Origin and relationship obscure-plant? animal? originated from aprotozoan-like ancestor? or from bacteria? fungi?

Habitat-they live in cool, shady places, moist areas (decaying logs or dead leaves-abundant moisture). Can be isolated from any place which contains abundant organic matter.

Plasmodium is considered the purest from of protoplasm encountered in nature and frequently employed for studies on chemical composition of protoplasm (not sure, as it contains food particles and other matter).

Life cycle-spores germinate under "favorable" conditions--1 to 4 flagellated swarm cells join--zygote (amoeboid)--multinucleate plasmodium with diploid nuclei. At maturity--fructification and meiosis--spores.

The spore's thick coat is resistant to unfavorable conditions-will germinate in water. pH, temperature, and media are important. Bile salts act as wetting agents or a weak solution of natural substances such as wood, bark, or hay.

Swarm cells-usually 2 flagella, absorb food from surroundings. Evolve towards amoeba stage and may ingest solid particles.

Greatest rate of flow of Physarium is 1.35 mm/sec.

Color may change as a result of pH.

Plasmodia feed on bacteria, spores. Some species can be grown axenically.

Some species produce soluble antibiotics. Ingestion of solid particles is most usual method of food intake. Wastes excreted and plasmodium moves away.

Physarium-nuclear division requires 20-40 minutes for completion and nuclei divide simultaneously.

Factors responsible for fructification not understood-pH, light, temperature, camp?

Discussion to be held after two weeks of observation of slime mold. This is to stimulate students to formulate hypotheses and to devise experimental procedures.

Discuss any suggested variable-can be based on any characteristic that the student requests.

EXAMPLE: Observe rate (meaning) of oscillation. Hypothesize (possible explanation) rate dependent on temperature rate dependent on age. (list all that the students suggest) How would you test these hypotheses? control - "normal" rate - average of plasmodium, limit variable to one, data and observations, results, conclusions-solution to problem.

Q. What do we observe about time and movement?

Q. We got many answers. How do we arrive at a time?
A. Take a class average.
But -- time can be misleading.
Q. What is the difference between rate and time?
Q. Now the question has become - Why do they move at different rates?
A. Hypothesis - depends on where food is placed. Discuss chemotaxis.

Student Criticism of Individual Experiments

EXAMPLE: Will more oatmeal flakes make slime mold develop more? quantitative - What controls are needed? Weigh slime mold, weigh oatmeal, placement of oatmeal. Is everything else constant? i.e. temperature, water, light. Weigh slime mold after procedure.

REVIEW OF SLIME MOLD LAB and DISCUSSION OF "HOW TO DESIGN and PERFORM AN EXPERIMENT"

What was the purpose in doing this lab?

1. Interest in biology (it is a 'fun' lab!)
2. Not everything has a definite answer. Is slime mold uni-or multi-cellular? Is slime mold a plant or an animal?
3. How to form hypotheses.
4. How to plan experiments.
5. How to do an experiment.
6. Importance of controls.
7. How to criticize an experiment.

Example of how to do an experiment:

1. We noted that plasmodium grow in many directions.
2. We were curious as to the causes.
    - Step 1 - Observation
    - Step 2 - Question
    - Step 3 - Hypothesis (or purpose of experiment) Students suggest several hypotheses and choose one to discuss.
        1) Grows toward chemical attractants (good-oatmeal)
        2) Grows toward bacteria (chemical attractant or food)
        3) Grows randomly
    - Step 4 - Procedure (students decide)
        - plasmodium or sclerotia of same weight
        - if plasmodium - same age
        - food at same distance
        - same amount of food
        - water supply
        - temperature same
        - light same
        - control - no food
        - control - will it move toward any substance (i.e. rock at same distance as food in control)
    - Step 5 - How to report results
        - pictures (camera)
        - weight of slime mold
        - diagram
    - Step 6 - Critical analysis of results

CONTRIBUTED BY

Lessons such as these were sent to the Nebraska Department of Education courtesy of Vincent Galasso, Bronx High School of Science, New York, New York. For further information or entire set, please write: Melodee Landis, Office of Gifted and Talented, 301 Centennial Mall South, Lincoln, Nebraska 68509.

SUBJECT AREA

Science

MATERIALS

Canned foods.

OBJECTIVES

Students will be able to:

1. Identify many of the ingredients in processed foods.

2. Describe the function of the common ingredients in processed foods.

DESCRIPTION

Students can learn about chemistry as well as the foods they consume by analyzing the ingredients in the processed foods they eat.

ACTIVITIES

1. Students are asked to bring to class the container of one processed food that they regularly eat.

2. Students make a list of the ingredients of five packaged foods brought by the class. Their problem: to identify the functions of each ingredient and classify each (e.g. preservatives, flavoring).

3. Ingredients may then be analyzed in many ways:

    A. What properties make them desirable for this product?

    B. What are their long term effects on people?

    C. Could the product be made without it?

    D. Which products have the most or least undesirable ingredients?

VARIATIONS

Perhpas a school education program could be begun. Place a "mystery ingredient" in class display window daily. For example, sign could read "Have you had your sorbito today?" or "Are you hooked on magnesium stearate?"

CONTRIBUTED BY

Idea from TAG booklet, "Happy Birthday to U.S." Murry and Roberta Suid, Addison-Wesley Publishing Company.

WHAT ARE ATOMS?

SUBJECT AREA

Science, Math, Language Arts, Social Studies

OBJECTIVES

After completing the experiments, the student should be able to:

1. Differentiate between/among: Law of Conservation of Mass, Law of Constant Proportions, and Law of Multiple Proportions; atomic mass and atomic weight; regular reaction and nuclear reaction; atom, ion, radical, element, and compound; atomic number, oxidation number, and atomic weight; proton and electron--charge and location; atomic weight and neutrons, protons, and electrons; atomic number and atomic weight; Level 1, Level 2, and Level 3 electrons; active and inactive elements; negative ion and positive ion or radical; conductor and insulator; metal and non-metal; Dalton's idea of atom and Greek idea of atom; Dalton's idea of atom and Modern idea of atom; combining capacity of atom; oxidation number of atom, and static and regular electircity.
2. -- when given the names of elements, represent them with their symbol and possible oxidation numbers.
3. Draw the structure of an atom or compound.
4. -- when given a list of elements, give some of the basic properties.
5. -- when given materials, group them as elements, compounds, mixtures, metals, and non-metals.
6. Give examples in which two elements react to form a compund and in which one compund decomposes to form two elements.
7. Predict properties of an element by using the name of an element and the table.

DESCRIPTION

Within a period of fourteen days, the pupil will be assisted in finding out why matter is electric in nature. He will be helped to learn the meaning and the importance of some laws controlling matter, how properties of elements are predicted, and how it is possible to change matter, control, and direct some of its changes. The student will be familiarized with the process by which inorganic matter is transformed to organic matter, as he will investigate the processes of storing up solar energy in the form of food. The learner will also familiarize himself with the writing of the symbolic representation of elements and compounds. The student will realize that the proper habits and care of his mind are basic and vital factors of self-improvement, since a considerable portion of this material will require memory and use of mind.

ACTIVITIES

Schedule: (Lecture, Laboratory, Homework, Tests)

1. Fourteen days

Enrichment:

1. Periodic table, historical reports, scientific contributions, models, and batteries.

Aspects of Integration:

1. Mathematics: Formulas, equations, positive and negative numbers, addition and subtraction of positive and negative numbers, graphs, and Ratios and proportion; scientific notations.
2. English: Study habits and skills, vocabulary synthesis and analysis, making generalizations, deductive and inductive thinking skills.
3. Social Studies: History of the discovery of elements and implications of the discoveries, vital role of chemical elements and compounds on the development of the body and mind of an individual and the special implications of their imbalance, relationship of man's control of chemical reactions on the quantity and quality of his environment and the world as a whole, major chemical products and their political, economic, and social implications.

Projects:

1. Assist students and Humanities teachers in projects on "Survival" and "Ecology."

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application.

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RADIATION DOSAGE

SUBJECT AREA

Science, Math

OBJECTIVES

Students will be able to tabulate an estimate of their yearly radiation doses.

DESCRIPTION

Students estimate their yearly radiation dosage.

ACTIVITIES

Directions: Complete the following table and then consider that information to answer the questions that follow.

Source of Radiation	Your Annual Dose (mrem/yr.)
1. Location: Cosmic Radiation at Sea Level add 1 for every 100 ft. of elevation where you live. (Omaha is about 1000 ft. above sea level)	40
2. House Construction: Wood 35 Brick 75 Concrete 50 Stone 70	
3. Ground: (U.S. Average)	56
4. Food and Water: (U.S. Average)	25
5. Air: (U.S. Average)	5
6. Jet Airplane Trips: Number of 6,000 mile trips x 4	
7. Radium Dial Wrist Watch: Add 2	
8. Television Viewing:	
Black and White Hrs. per day x 1	
Color Hrs. per day x 2	
9. X-Ray Diagnosis and Treatment: Chest X-Ray 150 Limb X-Ray 420 Stomach X-Ray 350 Dental X-Ray 20 Head X-Ray 50	

10. Nuclear Power Plant:

At Edge	Hrs. per day x .2	
1 mile away	Hrs. per day x .02	
5 miles away	Hrs. per day x .002	________

(Compare your dose to the U.S. Average of 200 mrem per year) Total ________

NOTE: One mrem per year is equal to:
- -Moving to an elevation of 100 ft. higher
- -Increasing your diet by 4%
- -Watching one additional hour of black and white television per day
- -Or taking a 4-5 day vacation in the Sierra Nevada Mountains.

Multiple Choice: Select the one best answer

_____1. Which condition would increase your annual radiation dose the least?
- A. Moving from 5 miles away from a nuclear power plant to right beside it
- B. Moving from sea level to Denver (about 6,000 ft. about sea level)
- C. Moving from a wooden home to a brick home
- D. Getting 2 instead of only one set of dental x-rays in one year.

_____2. Which condition would increase your annual radiation dose the most?
- A. Watching color television 1 hour per day
- B. Wearing a radium dial wrist watch
- C. Flying to Europe and back
- D. Working 8 hours per day next to a nuclear power plant

Fill in:

_____3. The maximum permissible exposure allowed for a radiation worker is 5000 mrem per year. How many 6000 mile trips per year would a jet pilot have to make to receive this dose?

_____4. How many chest x-rays or their equivalent could a person receive and not exceed 5000 mrem per year?

Minimum Score: 3 correct

SKILLS BEING DEVELOPED

Analysis, application.

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A COURSE OF STUDY FOR NUCLEAR SCIENCE

SUBJECT AREA

Science

MATERIALS

Films

A is for Atom, 15 minutes.
Living with Radiation, 45 minutes.
Fundamentals of Radioactivity, 30 minutes.
Atomic Physics, 90 minutes.
Controlling Atomic Energy, 13½ minutes.
A Sea We Cannot Sense, 27½ minutes.
Introducing Atoms and Nuclear Energy, 11 minutes.
The Mass of Atoms, 47 minutes.

Other necessary materials are given in each experiment.

DESCRIPTION

Below you will find the course outline and first unit for the study of nuclear science. The rest of the course is available at the address appearing under contributed by.

GENERAL OVERVIEW

The subject matter in this course cuts across the various scientific disciplines; consequently, it helps students tie together the various science courses they have taken. Radioisotopes are used as tracers in physical, chemical, and biological experiments. The course includes historical development of the atomic concept, atomic particles, electromagnetic radiations, the dualistic nature of radiant energy, some concepts of quantum theory, Compton scattering, the photoelectric effect, and radioactivity.

		Suggested Time	
	Unit	One Semester Program	Full Year Program
I	Introduction: Atomic Energy	2 weeks	3 weeks
II	Atomic Particles and Electromagnetic Radiations	2 weeks	3 weeks
III	The Dualistic Nature of Radian Energy	2 weeks	5 weeks
IV	The Structure of the Atom	3 weeks	5 weeks
V	Radioactivity	2 weeks	4 weeks
VI	Measurement of Nuclear Radiations	1 week	2 weeks
VII	Particle Accelerators	1 week	2 weeks
VIII	Nuclear Fission	1½ weeks	3 weeks
XI	Nuclear Fusion	1 week	2 weeks
X	Radiation Health Physics	1½ weeks	3 weeks
XI	Radioisotope Applications	1 week	1½ weeks
	Total Time	18 weeks	33½ weeks

UNIT I
INTRODUCTION: Atomic Energy
Suggested Time: 3 weeks

OVERVIEW

The early Greek Atomists held the view that all matter was composed of small invisible particles or atoma. This view was replaced by the theories of Aristotle which held sway for nearly 2,000 years until eliminated by the experimental and theoretical work of men such as Lavoisier, who gave us workable hypotheses from which our modern theories have evolved. A general comprehension of these early theories and how and why they have been replaced is perhaps the best way to understand the evolution of our present theories and to realize that these, far from being complete, are in constant revision in the light of new experimental knowledge.

OBJECTIVES

1. The class shall apply the historical evolution of the atomic theory as a prime example of science, using processes of induction and deduction from accrued data presented in the Nuclear Science Course to construct models that are subject to constant revision in the light of new experimental data.

   1.1 The student shall differentiate between inductive and deductive reasoning by identifying specific examples of each reasoning type from the material presented in the classroom.

   1.2 The student shall delineate graphically the Aristotelian view of matter and explain why it was no longer tenable following the work of Priestly and Lavoisier.

   1.3 The students shall explain the atomic concept as first proposed by Dalton. They will indicate the modern modifications of the original theory, supplying the experimental reasons for these modifications.

   1.4 The students shall construct, in historical sequence, the Daltonian, Thompsonian, and Rutherfordian models of the atom. They will list Bohr's modifications of the Rutherford atom and, finally, construct the probability cloud model.

   1.5 The student shall, in a test situation, correlate the symbol of each element with its accepted name from a list of all presently known elements shall be the lowest acceptable limit of performance.

   1.6 Given the periodic chart of the nuclides, the student shall identify the atomic weight, atomic number, electron shell configurations, number of neutrons, and common valence of atoms of elements chosen by the teacher.

1.6.1 Given a chart of the nuclides, the student shall identify the isotopes, isobars, isotones and nuclear isomers of elements selected by the teacher.

1.6.1.1 From the above mentioned chart, the student shall identify the type and energy of the nuclear emissions of radioisotopes selected by the teacher. The student shall also identify the daughter nuclide produced by the emission of that particle and construct a balanced nuclear equation for the reaction.

1.7 The student shall construct chemical formulas from a list of elements with their valences. The student shall then calculate the molecular weights of these compounds. Utilizing the Avogadro number, they shall calculate the weight of a single molecule of a preselected compound.

1.8 Through laboratory activities the student shall become proficient in the operation of radiation counting equipment and the quality control procedures for such instrumentation.

CONTENT

I. The methods of science

    A. Inductive and deductive reasoning
    B. Microphysics and macrophysics

II. The atomic concept

    A. Historical background

        1. The early Greek Atomists
        2. The Four Element Theory
        3. Lavoisier and the death of the Aristotelian view
        4. Dalton's Atomic Theory
        5. The nuclear atom
        6. Modern modifications of these theories

    B. The chemical elements

        1. Symbols
        2. Atomic number
        3. Atomic weight
        4. Isotopes, isobars, isotones, nuclear isomers

    C. Atoms and molecules

        1. Compounds
        2. The Molecular Concept
        3. Molecular weights: The Mole
        4. Molecular sizes
        5. The Avogadro Number

D. Basic Laboratory Techniques and Instrumentation

1. Laboratory Safety Procedures
2. Operation of Geiger-Muller Counters
3. Statistics of Geiger-Muller Counting
4. Efficiency of Geiger-Muller Counting

ACTIVITIES

Student Experiments

1. Scientific observation and description (Observations on a Candle: CHEM Study)
2. The Black Box: The methods of science (Chemical Bond Approach)
3. Determination of the operating voltage of the Geiger-Muller tube
4. Statistics of counting
5. The efficiency of a geiger counter
6. Determination of the Avogadro Number

Teacher Demonstrations - Discussions

In this unit the following are recommended:

1. The electromagnetic spectrum
2. Electron energy levels of the Bohr atom as indicated by emission spectra of substances energized with ultra-violet light.
3. The correct operating procedures for the radiological instruments used in the course
4. Shielding from nuclear radiations; safety techniques.

CONTRIBUTED BY

Reprinted with permission from John J. McDermott, Director; Nuclear Science Program from Nuclear Science, 1977; Pennsylvania Department of Education; Box 911; Harrisburg, Pennsylvania 17126. (Nuclear Science available by writing above address)

DRINKING BIRDS

SUBJECT AREA

Science

MATERIALS

Drinking birds - transparent is best. (see diagram below) Available at most dime stores or Lakeside Import Company, 6646 N. Westem Avenue, Chicago, Illinois 60645. (Cost is $7.80 per dozen. $79.20 per gross)

OBJECTIVES

Major science concepts relating to the "drinking bird."

First Law of Thermodynamics
Second Law of Thermodynamics
Conduction
Convection
Radiation
Center of gravity
Fulcrum
Dynamic equilibrium
Static equilibrium
Surface area
Energy transfer
Energy chain
Energy receiver
Energy source
Density
Viscosity
Specific heat
Latent heat of vaporization
Evaporation
Condensation
Boyle's Law
Charles' Law
Interaction
System
Subsystem
Density
Variable
Capillary action
Work
Friction
Efficiency
Thermal efficiency
States of matter
Property
Absorption
Vapor pressure

Science processes with which students can become involved:

Observing, classifying, measuring, communicating, using numbers, predicting, inferring, defining operations, controlling variables, experimenting, formulating hypotheses, formulating models, interpreting data, using time/space relationships.

DESCRIPTION

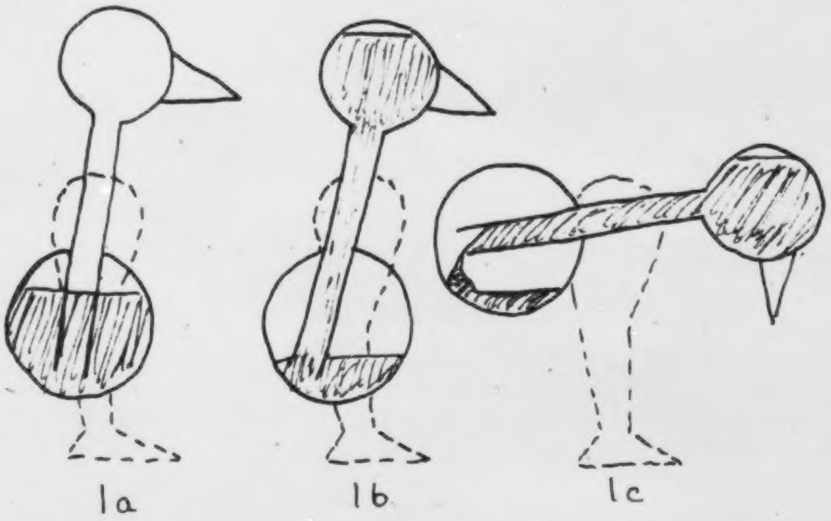
Here is an example of what types of classroom learning may take place with a simple commercial product. How the bird works:

As shown in Figure la, the head, neck and body of the drinking bird are interconnected hollow chambers. These chambers, from which air has been evacuated, are partially filled with a volatile liquid -- preferably one with a low heat of vaporization, high density and pressure, and with a boiling point near normal room temperature. A number of working fluids are used in the birds, including dimethyl ether, methylene chloride (dichloromethane), and trichloromono-fluoromethane. They are very volatile, and some are extremely flammable. Vapors are toxic. Thus, the bird should be handled with respect, and never used near an open flame. (If the working fluid is not specified, assume it is flammable.)

Initially, the bird is in a state of static equilibrium (that is, it is not working). (See Figure 1a.) When the head is wet, the water on the surface begins to evaporate, cooling the head. This cooling reduces the vapor pressure in the head area causing the gas pressure in the lower bulb to become greater than that in the upper bulb. This pressure difference forces the liquid up the tube and into the head (Figure 1b).

The bird therefore becomes top-heavy and tips over, but is stopped before reaching a horizontal level, because the liquid in the lower end of the tube becomes higher than that in the lower bulb. Thus, the liquid in the upper bulb returns by gravity to the lower bulb, while, simultaneously, the gas in the lower bulb bubbles up into the head (Figure 1c).

The bird returns to the starting position and the cylce is repeated; it will continue as long as there is a sufficient difference in temperature between the upper and lower bulbs.



ACTIVITIES

Inquiry strategies: The bird can be used to explore numerous major science concepts. The following questions should provide adequate stimulus for student investigations. The list is not exhaustive and is not in sequence according to level of difficulty or order of development. Activities and concepts should be carefully selected according to the levels, interests, and abilities of your students.

1. Observe the bird carefully and describe as many physical properties as possible.
2. How many states of matter are present in the bird system?
3. What must you do in order to make the bird dip continuously?
4. Describe one cycle as you see it (using drawings).
5. Is anything consumed as the bird dips?
6. What is the purpose of the "fuzzy" head?
7. What causes the liquid to rise in the neck during a cycle?
8. What is the bird's energy source?
9. What kind of energy does the bird utilize?
10. What is the purpose of the water on the head?
11. What is the energy receiver?
12. Describe the energy chain.
13. How would you explain the operation of the bird?
14. What variables do you think would affect the rate of dipping? List them.
15. Set up an experiment to determine the variables that would produce the fastest rate.
16. Determine the number of dips per minute.
17. How many dips would the bird make in one hour? day? month? year? (assuming the rate is constant)
18. Would changing the pivot point affect the rate of dipping?
    a. How far does the head move vertically in one dip? (in centimeters)
    b. Can you invent a system that will cause the bird to move in a horizontal direction in response to the dipping motion?
19. Will relative humidity affect the rate of dipping? How can you find out?
20. Will the bird dip faster in- or out-of-doors? Why?
21. Does the bird have a radiator? If so, what is its function?
22. Can you make the bird dip without wetting the head?
23. Would the type of working fluid in the bird influence the rate of dipping?
24. Would the color of the bird's parts affect the rate of dipping? Confirm your hypothesis.
25. Would the type of material from which the bird is composed (such as glass, dopper, aluminum) affect the rate of dipping?
26. Would a breeze affect the rate of dipping?
27. Would direct or indirect sunlight give the highest rate of dipping?
28. Which portion of the bird is warmest? coolest? How can you measure these temperatures?
29. Can you predict characteristics of the enclosed liquid?
    a. What will happen to the dipping cycle if the head dips below the horizontal plane?
30. Describe the environment necessary for continuous and maximum operation.
31. Under what conditions will the bird fail to operate?
32. For what practical applications can the bird be used? Can you invent methods of harnessing the dipping motions into useful work?

The table below lists physical properties of several substances that can be used as working fluids for the bird system. The questions that follow are related to these data. (Note: It is important that students not attempt to make "systems" using different fluids for comparative purposes; these should be purchased.)

a. Which working fluid would be the least desirable from a safety standpoint? Why?

b. What effect would a working fluid with a higher heat of vaporization have on the dipping rate as compared to one with a lower heat of vaporization? Why?

c. Would a working fluid with a high density be more desirable for optimum rate of dipping than one with a lower denisty? Why?

d. What boiling point would be ideal for the working fluid? Why? (Assume the system will be used at room temperature -- 20°C.)

e. Would a working fluid with a high or low vapor pressure be more desirable for optimum dipping rate? Why?

f. Using the data from the chart, could the best working fluid be absolutely determined for a given set of operating conditions? Why?

References:

1. Lear, John. "New Waterbird for Egypt: A Robot Shadoof." Saturday Review, June 3, 1967, p. 49.
2. Lindsley, E. F. "Wally Minto's Wonder Wheel." Popular Science 208(3); 79; March, 1976.
3. The Minto Wheel, Sunpower Systems, Inc., 1121 Lewis Avenue, Sarasota, Florida 33577.
4. Miller, Julius Summer. Physics Fun and Demonstrations. Central Scientific Company, Book #58225.
5. Murrow, Richard B. "Where Is Science Taking Us?" Saturday Review, June 3, 1967, pp. 51-55.
6. Wolfe, Elgin. "Drinking Bird Mystery." The Science Teacher 42:31-32; December, 1975.

Working Fluids

	Density g/ml	Mol. wt.	Boiling Point °C	Heat of Vaporization Jig	Vapor Pressure kPa
Methylene chloride (nonflammable, toxic)	1.34	84.9	40		
Diethyl ether (flammable, toxic)	0.71	74	34.6	375.8	61.0
Trichloromonofluoromethane--"Freon 11" (nonflammable, toxic)	1.48	137.4	23.8	180.4	
Dichlorodifluoromethane--"Freon 12" (nonflammable, toxic)	1.31	120.9	-30	164.9	584

VARIATIONS

"Drinking Birds" can also be used in the study of heat and heat engines, Egyptian irrigation, energy transfer, sources and receivers.

What other products can you analyze?

SKILLS BEING DEVELOPED

Application, synthesis, evaluation.

CONTRIBUTED BY

Reprinted with permission of: William E. Spooner, Department of Public Instruction, Division of Science Education, Raleigh, North Carolina 27611; from an article in Science Teacher: "Classroom Ideas -- Energy is for the Birds Too." September, 1977, pp. 34-35.

SOUND PICTURES

SUBJECT AREA

Science, Art, Music, All

MATERIALS

Tuning fork, drum, sand, oscilloscope, tape recorder.

OBJECTIVES

Students will be able to:

1. Distinguish different qualities of sounds.
2. Make their own compositions using different sounds.

DESCRIPTION

This is an interesting study in sound as well as an aesthetic experience to create a "sound picture" or a "sound composition."

ACTIVITIES

We all know that sound creates vibrations. To see these vibrations:

1. Strike a tuning fork and immerse it in water. What happens?
2. Place some sand on the head of a drum. What is the result when you strike it?

An Oscilloscope registers variations of electrical current and photographically records them. Each picture has the same shape of the fundamental tone but has a distinctive pattern of squiggle caused by overtones or harmonies. Consequently each sound has a different timbre. A flute playing A & C noise singing the same A will look:

1. the same? 2. different?

Connect a microphone to an oscilloscope. Sing one tone into the microphone. Reproduce the sketch of the wave pattern shown on the oscilloscope by:

1. Using a tape recorder to record your theme and vibrations;
2. Using sound or sound recorder technique with a reel-to-reel tape recorder. Make a composition mixing up all your variations with your theme and with each other's.

   Remember there is a speed control on the recorder and faster-slower speeds recorded over each other create very good effects.

3. Can you graph or score your composition on a piece of graph paper as you made it on the tape?

VARIATIONS

Language Arts: Use sound compositions to back up certain pieces of literature (students can create their own too). Also, can be used in conjunction with study of "mood" in literature.

Social Studies: Sound compositions of different environments often may relate to social studies units.

Math: Use in conjunction with graph study.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application, synthesis, evaluation.

CONTRIBUTED BY

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SUBJECT AREA

Science

OBJECTIVES

Students will be able to apply Einstein's Theory to a space war simulation.

DESCRIPTION

Below is some background and a problem relating to Einstein's Theory of Special Relativity. It was published in a student science publication out of Stuyvesant High School in New York.

ACTIVITIES

Introduction

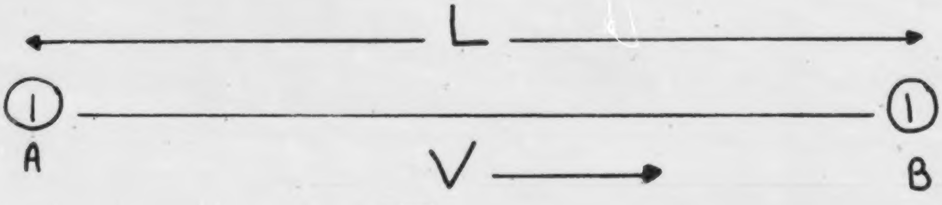
Since its publication seventy years ago, Albert Einstein's Theory of Special Relativity has profoundly changed the physicists' perspective of the universe. By introducing altered concepts of space and time, the theory has produced many results which defy common sense, the collective prejudices of mankind. The following "paradox", besides illustrating important consequences of special relativity, provides an opportunity to demonstrate how our intuitive grasp of a physical situation can be so inadequate for modern physics.

For reference and review, the following relations are included:

$$t' = \frac{t - \frac{vx}{c^2}}{\sqrt{1 - \frac{v^2}{c^2}}} \qquad X = \frac{x - vt}{\sqrt{1 - \frac{v^2}{c^2}}}$$

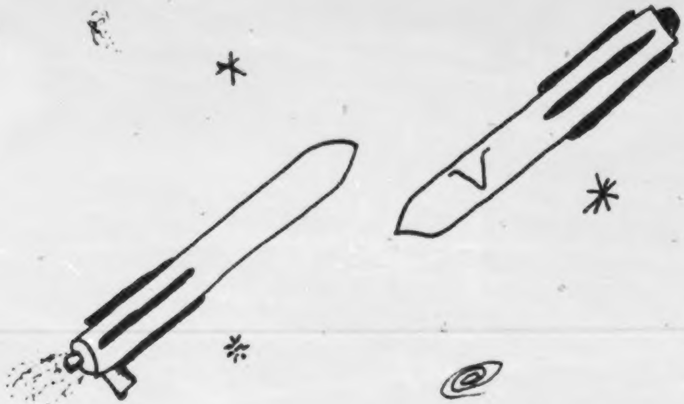
where v is the relative velocity between two intertial frames of reference; (t,x) are the time and space coordinates of an event in frame Sand (t',x') those in Frame S'.

When two clocks are separated by a distance L in their proper frame, and are both moving along their axis with velocity v relative to an observer O, O perceives the rear clock to be ahead of the first by a time equal to Lv/c^2.



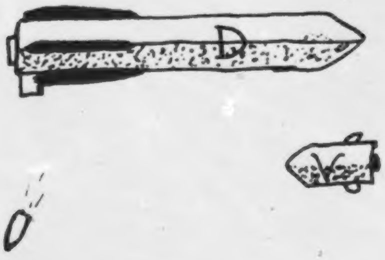
The Paradox

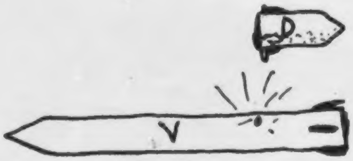
Two races of intelligent aliens are engaged in a deadly war for control of the galaxy. A Dorsai warship is determined to destroy a Vorn passenger vessel. Both are ten meters long and are traveling towards each other with velocity $u = \sqrt{15/16}\,c$. The Dorsai ship has a sensor on its nose so that the cannon on its tail will fire an extremely fast missile when the sensor coincides with the tail of the Vorn craft.



Now in the Dorsai frame of reference, the Vorn ship is rushing forward at $\sqrt{15/16}\,c$. As $L' = L\sqrt{1 - \frac{u^2}{c^2}}$, it appears only 2.5 meters long, so that the shot will obviously miss.

However, in the Vorn frame, the Dorsai rocket is merely 2.5 meters in length, and, obviously, the ship will be blown apart. Either the ship explodes or it stays whole, it cannot do both. What actually happens?

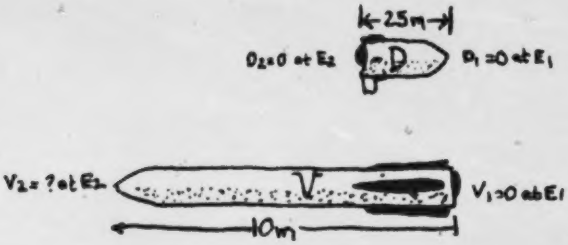




The Solution

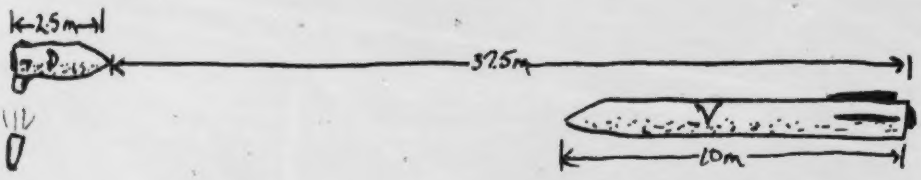
The Vorn got away without a scratch since time, as well as length, is dependent upon velocity. To prove that the shot misses, we look at the events in the Vorn's proper frame. (We could do the same in the Dorsai frame):

Introducing clocks V_1, V_2, D_1 and D_2 at both ends of the ships will help clarify the situation. Also, let E_1 be the event of the sensor activating, and E_2 be the firing of the missile. Clocks V_1 and D_2 read zero at E_2.



According to the warship, there is no time delay between the sensor activating and the shot firing. Therefore, if $D_1 = 0$ at E, then $D_2 = 0$ at E_2. However, the Vorn observe that the Dorsai clocks do not run in unison, but that D_3 is ahead of D_1, by $\frac{Lu}{c^2}$ or $\frac{2.5\sqrt{15}}{c}$ seconds. Because two observers must agree on the simultanity of two events occurring in the same place and time, the Vorn agree with the Dorsai ship that D_2 reads zero when the cannon shoots.

Therefore, the Vorn note that D_2 must have read zero some time before $D_1 = 0$. As the Vorn say that the Dorsai clocks run slowly ($t' = t\sqrt{1-\frac{u^2}{c^2}}$) E_2 occurred at $t = -Lu \div (c^2\sqrt{1-u^2/c^2})$ or $\frac{10\sqrt{15}}{c}$ seconds ago. In that time, the Dorsai traveled a distance d=ut or 37.5 meters. This means that the missile was fired 30 meters in front of the target, and the Vorn were saved by extremely poor marksmanship.



SKILLS BEING DEVELOPED

Application

CONTRIBUTED BY

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MODEL ROCKETRY

SUBJECT AREA

Science

MATERIALS

Rockets, classroom and a suitable launching site. (We launch from a ¼ section alfalfa field near town.)

DESCRIPTION

The unit has been put together by Estes Rocket Company. I have found it to be a safe and economical outside activity for those students interested in rocketry. The students experience in building their own rockets provide a good teaching environment for learning. Many students in fact will go ahead and continue the study of rocketry and related sciences after the unit is completed.

ACTIVITIES

1. Introduction: Films, Course overview, Selection of Rockets, etc.
2. Terminology: Words, and symbols common to aerospace.
3. Theory of flight.
4. History of Jets and Rockets.
5. Powerplants.
6. Rocket propulsion systems.
7. Guidance and controls.
8. Model rockets.
9. Fabrication.
10. Launch.
11. Written objective evaluation.

I feel this unit is an excellent unit for Junior High Science units. Not only does the student learn valuable facts on rocketry but many more concepts come across as they become involved in the project. They get a chance to improve their skills in group activities. Their math skills are improved as they learn to teach and calculate the altitude the various rockets reach. Also if the student wishes, kits are available which let them show their creativity in building and designing their own rockets.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application, synthesis, evaluation.

CONTRIBUTED BY

Randy Wilson, Cozad Junior High School, Cozad, Nebraska.

UNIT ON
ASTRONOMY - ASTROPHOTOGRAPHY

SUBJECT AREA

Science

MATERIALS

35mm camera with time exposure capability, a cable release, a roll of Kodak's Ektachrome 200 color film, a time keeper of some sort, a directional compass, a current issue of a periodical such as Astronomy, or Natural History, or Sky and Telescope, a tripod for the camera, and a star chart.

DESCRIPTION

What follows is a description of a nuclear activity which has great outreach as far as expansion into different areas is concerned; can be embarked upon with relatively little expense; and one in which the start-up instructions are readily available. A PRECAUTIONARY NOTE: be advised that there exists that chance factor, called the Kettering Principle by Dr. James H. Austin, that the student through his general exploratory behavior might actually make an original discovery!!!

ACTIVITIES

This celestial adventure can be initiated with the simple question: "Who would like to photograph constellations?"

Students answering your question in the affirmative may be opening the door to any of the following areas of knowledge which will be sampled before this activity is concluded, if it ever is. Here is a partial list of the areas which may be touched upon: anthropology, celestial coordinate systems, computer programming, constellations, extra-terrestrial intelligence, film chemistry, interstellar distance scale, Kepler's Harmonic Law, maps-both terrestrial and celestial, mythology, photometry, planetary distances, planetary ephemerides, Purkinje Shift, stellar brightness scale, time - both incremental and relative, variability in stellar brightness, and Wien's Law.

The appearance of the night sky is described in any of the periodicals mentioned above. Beside the brighter stars and constellations, you will also find the planets which are of naked eye visibility. A typical description follows: "Jupiter will be found this month in the constellation of Taurus shining at a magnitude of -1.2, making it the brightests object in that part of the sky. Taurus is high in the eastern sky by 9:00 p.m. EST." This information is more than sufficient for the student's purpose - to locate a specific constellation which will be the object of the evening's photography.

You may wish to have the film loaded into the camera by the student, while you observe the proceedings with care. This way you can point out a foolproof way to monitor the advances of the film from one frame to the next. As the camera is cocked you should observe the rewind knob to be certain that it is rotating for if it is not then the film is not advancing even though the camera's counter indicates that it is moving ahead. If the rewind lever or knob is not turning as the camera is cocked, then open the camera to determine the nature of the problem. You may find that the sprocket holes have been torn or that the film has slipped off of the take up reel. Few things will chill a student's enthusiasm as quickly as an unexposed roll of film returned by Kodak.

Once all is properly working have the student mount the camera, sans case, on the tripod. Attach the cable release, focus the camera at infinity (the ∞ symbol on the focusing ring), and set the exposure meter on B, which is the time exposure setting. As long as the thumb button on the cable release is depressed, the camera's shutter will remain open, allowing light to expose the film. The f/stop recommended is the fastest on the camera, typically 1.8, 1.4, or 1.2. The smallest number denoting the largest diaphragm opening.

With the camera loaded and the mechanicals taken care of, give the student the entire affair, along with the directional compass, time keeper, and a log book or sheet to keep track of the exposures made. It will be the student's job to locate the constellation in question, set up and properly orient the camera, and expose the film for the given period of time. What generally happens when night falls is described in the following hypothetical, but realistic scenario.

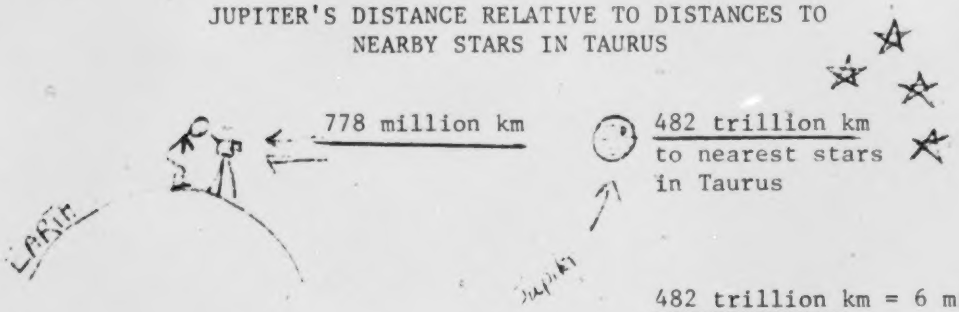
The neophytic astrophotographer finds himself in the gathering gloom with a tripod-mounted camera loaded for Ursa Major and others. Additional equipment includes the time keeper, directional compass, light source, and log sheet. At the appointed hour of nine o'clock he uses the directional compass to locate the cardinal point of East. Directing his gaze upward into the night darkened sky the student acquires the brightest object in that part of the sky, which should be Jupiter. (Remember the description provided in the periodical.) All that must be done now is to begin photographing. The camera is pointed, the time exposure is made, and the elements of the adventure are joined. What will be the consequences of this act?

1. The field or angular region covered by the typical 50mm lens is 27° x 39°, or 1,053 square degrees. This is sufficient to capture any constellation. Thus, when the student points the camera at Jupiter he is also taking in most of Taurus.

2. The recommended exposure time is 24 seconds. With the high speed film employed (Ektachrome 200) all objects visible will be recorded during the recommended exposure time without any effects imparted by the Earth's rotation. If you wish, you could have the student photograph the same area several times the first night, varying the exposure time with each picture. Since the stars seem to move an angular distance of 1° in 4 minutes, the student might use exposures of 4, 8, 12, 16, and 20 minutes. The results would be pictures with star trails of 1, 2, 3, 4, and 5° long, respectively.

On night #1, the film will record the position of Jupiter in the sky relative to the "fixed" stars. From the sketch below it can be seen that the stars are at least six million times further away than Jupiter. Therefore, even if the stars were moving through space at the same rate Jupiter is, but in random directions, the planet's motion would be six million times more obvious.

JUPITER'S DISTANCE RELATIVE TO DISTANCES TO
NEARBY STARS IN TAURUS

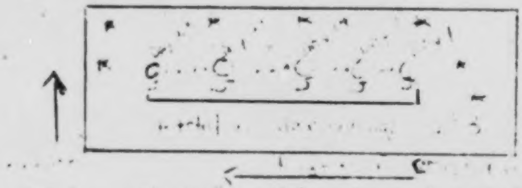


$$\frac{482 \text{ trillion km}}{778 \text{ million km}} = 6 \text{ million}/1$$

Hence, if pictures were taken of Jupiter at weekly intervals, say five pictures in all, it will immediately be seen that Jupiter is moving relative to the stars. If the planet's motion appears to be eastward relative to the stars then the planet is said to be moving directly, as it should be since it is moving counterclockwise or eastward around the sun. If, however, the student is fortunate enough to catch the planet, this slow moving giant, as the speedier Earth overhauls it, then his pictures will show Jupiter drifting westward relative to the stars. Jupiter's orbital speed is 13km/s, relatively slow, while the Earth moves around the sun at an average speed of 30 km/s. This rather awkward situation is called retrograde motion. If interpreted literally, it would indicate that Jupiter has ceased its normal counterclockwise motion around the sun and is now moving contrary to the other planets.

Once the series of slides have been taken and developed (Be sure to use Kodak processing because they number each slide, allowing the student to get the most from his records), they can be projected onto a star chart so that the star images are properly registered with the stars on the chart. Once this is done the position of Jupiter can be drawn in. By repeating the process, the student can easily plot the motion of the planet relative to the stars. With very careful measurement and some simplifying assumptions, the student can even get an idea as to how far away Jupiter is from the Earth.* The thinking follows:

Let's say that the student photographs Jupiter weekly for four weeks, obtaining five pictures during the period. After plotting them on the star chart, his work would appear something like this:



Star map plot of
Jupiter's motion
[illegible]

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*This method feasible when planet is in eastern or western elongation.

Assuming that Jupiter moves at an average orbital velocity of 13 km/s and that the pictures were taken over a period of 28 days or 2,419,200 seconds, then Jupiter moved about 31,449,600 km in that time. Since Jupiter's apparent angular motion depends on how far away the planet is, then knowing its actual speed will allow us to determine the distance to the planet in this fashion:

$$\text{Distance to Jupiter in km} = \frac{\text{1 radian x distance travelled in km}}{\text{apparent distance travelled in }^{\circ}}$$

$$= \frac{(57^{\circ}.296)\ \ (3.145 \times 10^{7}\text{km})}{2^{\circ}.3}$$

Distance to Jupiter = 7.83 x 10^{8}km or good agreement with Jupiter's average distance from the sun.

3. The color film will show that the usual white stars are actually quite colorful, ranging from the voilets through the visible spectrum to the reds. The student has photographed the total visible energy coming from the stars. If the star is not overly birght then the dominating color in the star's spectrum will expose the film to the greatest degree. Viola!!! Red stars, orange stars, blue stars, and so on. At this point a clash occurs between the esthetic and artistic interpretation of color and the physical basis for the origin of the color. While we speak of reds being warm colors and blues being associatives of ice and cold, the astronomer and the physicist can show that as a hot solid (or star) heats up, its peak energy emission moves from the reds through the visible spectrum to the blues and the violets. Should the student wish to pursue this arithmetically, a useful reference is Wien's Law. The chart below will be adequate for our purposes.

COLOR OF STAR	APPROXIMATE TEMPERATURE	
	°Kelvin	°Fahrenheit
Violet	11,000	20,300
Blue	7,000	13,100
Yellow	5,000	9,500
Orange	4,000	7,700
Red	3,000	5,900

Aside from determining the approximate stellar temperatures as a function of their color, an interesting consideration is the numeric mix of stars with respect to color and the location in the sky. For example, the student might compare a photographic sample taken in the Milky Way region with one 45° or so from it. Another variation is the relation between star color and brightness. Are there more bright reds than blues? Or is the converse more correct? By carefully examining this realistic but hypothetical series of explorations with Dr. Robert F. Eberele's Four Step Model in mind, the dissection of the Jupiter's Position activity appears so:

Step ****

....Synthesize the arithmetical relationship for determining Jupiter's distance from the elements derived in the lower steps.

....From this specific example, generalize the relationship of apparent angular motion or size, distance, and the real sizes and motions.

Step ***

....Define the nature of the radian and how it applies here.

....Integrating the star map plot of Jupiter's apparent angular motion with the time span of the observation.

....Evaluating the apparent motion of the planet in terms of its actual orbital velocity.

....From the apparent direction of Jupiter's motion on the star map plot, judge its actual orbital motion in terms of directness.

Step **

....Setting up the proper configuration of equipment needed to superimpose the star images on the star chart.

....Comparing and contrasting Jupiter's position in the sky to those of the fixed stars.

....Organizing a method for analyzing Jupiter's apparent angular motion during the 28 day period.

Step *

....Using the compass to locate the cardinal point of East.

....Recalling the position of Jupiter in the sky from the description given in the monthly periodical.

....Looking for Jupiter among the starfield and identifying it based upon a recollection of its brightness.

To get the uninitiated started we have listed some very good and readily available references which should be all you need to get your own adventure underway.

Monthly Periodicals:

Astronomy, available from Astronomy, 411 E. Mason Street, 6th floor, Milwaukee, Wisconsin 53202. $12/annum

Sky & Telescope, Sky Publishing Corporation, 49-50-51 Bay State Road, Cambridge, Massachusetts 02138. $10/annum

Annual Publications:

The Observer's Handbook, the Royal Astronomical Society of Canada, 124 Merton Street, Toronto, M4S 2Z2, Canada

The American Ephemeris and Nautical Almanac, U.S. Government Printing Office.

Star Charts:

MAG-5 Star Chart available from Talcott Mountain Science Center @ $2.00.

Skalnate Pleso Star Chart, available from Sky Publishing Corporation, Cambridge, Massachusetts 02138.

SKILLS BEING DEVELOPED

Step **** Creating - Inventing-synthesizing-generalizing.

Step *** Defining - Discovering-Hypothesizing-Abstracting-Integrating, judging, evaluating

Step ** Inferring - Imagining-Exploring-Organizing-Analyzing, comparing and contrasting

Step * Retrieving - Reflecting-Remembering-Recalling, identifying-discriminating, perceiving, sensing

CONTRIBUTED BY

Connecticut State Department of Education, Bureau of Pupil Personnel/Special Education Services, Hartford, Connecticut. Other units available from Conn-Cept II, Developed by Talcott Mountain Science Centers, Avon, Connecticut.

THE SHORTEST ROUTE

SUBJECT AREA

Science

OBJECTIVES

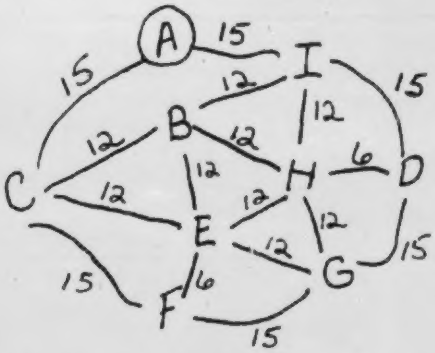
Students will be able to plan an efficient route.

DESCRIPTION

Students are to plan the shortest route that will reach each point of a map and return.

ACTIVITIES

Directions: Consider that you are doing future planning. You might be planning a system of roads, a mass transit route, a system of pipelines or a personal trip. In any case you wish to select the route that will reach each point of the map and return you to your starting point A covering the least distance in kilometers (km), and therefore the route requiring the least fuel, cost and material.



Your Route: Total kilometers of shortest possible route _________.

Start A
Finish A

Minimum Score: 1 correct

You must also indicate the order of points on your route.

SKILLS BEING DEVELOPED

Application, synthesis.

CONTRIBUTED BY

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SUBJECT AREA

Science

OBJECTIVES

Students will be able to gather information, experiment, observe and draw conclusions concerning their environment.

DESCRIPTION

Here are investigations from which students can draw practical conclusions.

ACTIVITIES

1. Collect soil samples from different places around the school or in your neighborhood. Experiment with them to see which are driest, which stick together best and which are easiest to excavate. Discover by testing which type of soil would be best for making different types of fossils. Experiment using leaves, twigs, bugs and pieces of pottery. Record your findings.

2. Go outside and collect all different kinds of things that were once alive. Experiment with the things you have collected by placing them in soil, water and other solutions. How do they decay? Graph the rate of decay for each thing in the experiment. Make a collection of things that you found which are decayed. Compare them. How do they feel, look and smell? Draw a "before" picture to show what decayed things looked like when they were alive. Record your findings.

3. Go outside and make plaster casts of footprints. Bring them back and classify them according to what made them. Look through books to see if you can match any footprints you have collected to those found in the books. Match the footprints you have collected to footprints of something that might have lived in the ancient world. Record your findings.

4. Notice how different places keep things differently. Choose one object. Collect five of this object. Place each one in a different place, such as the refrigerator, dark closet, and under the ground. Leave them there for a week. What has happened to each of them? Record the results. Pick a place outside which you think would be good for keeping or preserving something. Put five different objects in this place. Observe which has kept the best after a week. Make a graph to show the difference. List the ways that man has preserved things. What things has man preserved? Research finds and formations that have been preserved. Record your findings.

5. Observe the activity within the ant farm for a period of five days, for 15 minutes each day. Write down your observations and record the time that you observed. Make a chart showing the ways the ants' activities were similar to your family life. Also show on your chart the differences you observed. What kinds of "family" patterns can you find in your independent study?

6. Investigate recipes to see if there is a common ingredient. Do controlled experiments to discover what ingredient causes it to rise. Does the same ingredient have a different effect on foods that aren't baked -- as fermented foods? How did pioneers make breads, cakes, etc. before the ingredients you have just discovered were perfected? Can you produce a rising agent?

SKILLS BEING DEVELOPED

Application, synthesis, evaluation

CONTRIBUTED BY

Reprinted from "Probe It - Prove It" by Diane Dudley, Department of Education, 301 Centennial Mall South, Lincoln, Nebraska 68509.

ENVIRONMENTAL SCIENCE UNIT

SUBJECT AREA

Science

OBJECTIVES

Students will be able to observe and analyze different organisms and chemicals present in their environment.

DESCRIPTION

Some teachers are currently offering study in environmental science- here is one example of such a unit.

ACTIVITIES

Environmental Science is an interdisciplinary subject combining knowledge from the Biological, Physical, Chemical, Geological, Social, and Political Sciences. Our approach was to start the course with lecture material on Ecological Principles interspersed with field work in the woods and stream adjoining the school.

After the students learned how nature operates in keeping ecosystems in balance, we began studying how man with his technological way of life has disrupted this balance. This section of the course was subdivided into Water Pollution, Air Pollution, and Hand Pollution. Our methodology involved training students in the use of pollution monitoring equipment followed by field trips to polluted areas in and around Hampton.

The final section of the course dealt with the ways man is trying to regain nature's balance and what changes in his living habits he will have to make in order to do so. Field work in this area included visits to NASA, VIMS, Amoco (Yorktown), and Allied Chemical (Hopewell), as well as attending Virginia Air Control Board hearings and working with Campaign Clean Water.

At the conclusion of the six-weeks course students were required to put this acquired knowledge to use by starting a year long individual research project.

Field Work Natural Ecosystems

1. Food Webs: Although it is hard to catch an organism at the dinner table, one can get some idea of its trophic level by counting the relative numbers present in an area and remembering that as a general rule, the greater the number present the lower the trophic level, i.e. it takes large numbers of first order consumers to feed second order consumers, etc.

Population counts may be taken in several ways depending on the type of ecosystem studied. For example, known volumes of soil litter can be bucketed and brought into the lab for counting, random points or grid points can be measured off and trees counted, known volumes of stream water collected, etc.

2. Dominance: From the above population counts one can determine which species are dominant an an ecosystem. The type of species which are dominant tells one something about the average physical conditions present. For example, it is known that certain species of algae predominate in polluted streams.

3. Habitats: If, while one is collecting and counting organisms one records the places where they are found, one will discover that each organism lives in a particular habitat, thus one would see that wolf spiders are abundant in leaf litter, but not in branches of trees like the web spinners and crayfish are more abundant on stream bottoms than at the surface, etc. A corollary investigation would be to investigate the morphology of the organism to see how it is adapted to its habitat.

4. Physical Parameters: Physical parameters such as light, temperature, humidity, chemical nutrients and pollutants, etc. can be measured in different areas (bottom, middle, top of stream or soil, litter, surface of ground, tree level in woods) to see how habitats (often only inches apart!) differ physically one from the other.

A simple experiment on CO_2 levels in woods and open area can be done by taking an aquarium pump and bubbling air through a weak (1.01-.001N) sodium hydroxide (NaOH) solution to which has been added a few drops of phenolpthalein indicator and noting the relative time it takes the CO_2 to neutralize the NaOH and cause the indicator to change color.

Balanced ecosystems can also be studied by setting up aquariums and terreriums. These are good to use, because one can deliberately unbalance them and observe what happens.

Pollution Monitoring

Many companies are now getting into the pollution monitoring equipment business and may have testing material available to order. Water analysis is the easiest and most accurate to do followed by soil, then air. There are many problems associated with air analysis, one of which is that bubblers must be set up and run for several hours.

Some tests which may be run for water analysis are: dissolved oxygen (D.O.) - low D.O. means things can't live in the water; nitrate, nitrite, and ammonia - good for plants, but toxic to animals, usually a sign of organic waste pollution; Phosphate - excessive amounts cause algae to grow wild causing decreased D.O. and usually smell bad; heavy metals (mercury, lead, cadmium, zinc, copper) - toxic to animals and somewhat to plants, sign of industrial waste pollution; Hydrogen Sulfide - low D.O. smells bad, sign of rotting organic material or industrial wastes;

bacteria - cause disease, sign of organic waste pollution (pollen can be run in air samples).

Soil and air tests are similar, but are harder to run and are less accurate.

Som Student Research Topics

Comparison of Results of SO_2 Analysis Using Different Techniques
Comparison of Results of O_2 Analysis Using Winkler Method and D.O. Meter
Effects of Noise Pollution on Rats
Effects of Noise Levels on Ability to Perform Mental Tasks
Monitoring of Noise Levels in Various Human Environments
Toxicity Levels of Various Pollutants on Various Organisms
A Study of Beach Erosion Using a Model Wave Tank
Pollen Analysis in Hampton's Air
Bacterial Analysis of Hampton's Water
Hunt's Crabmeal Factory-What's That Smell!
Water Analysis of Bailey's Creek
Roadbed Materials from Recycled Materials

SKILLS BEING DEVELOPED

Knowledge, analysis, application

CONTRIBUTED BY

Nedra Harkavy, Director of Programs for the Gifted, Hampton City Schools, 19 Carry Street, Hampton, Virginia 23669.

DEVELOPMENT OF CREATIVITY
FIELD STUDY METHOD

SUBJECT AREA

Science

OBJECTIVES

1. Places the student in a position of understanding other people's opinions.
2. Develops sensitivity to other people's problems.
3. Gives the student practice in communication skills.
4. Trains the student in the art of inquiring.
5. Exposes the student to nuances of meaning that will further his understanding of social behavior in general.

DESCRIPTION

The social sciences offer a unique opportunity for developing creative approaches in interpersonal relationships. The field-study method, when used by students, has advantages as above.

ACTIVITIES

Topics for Interviews

Topics for exploration in interview situations are as follows:

1. What are some good questions to ask around our school?
2. What do you think is the difference between observation and introspection?
3. How would you compare instinct in man and in lower animals?
4. Some psychologists think that the human animal may enjoy torturing himself to a slight extent. What do you think?
5. There is nothing good or bad; thinking makes it so.

Topics for the Classroom

The topics suggested in this section are only a few of many that can be used by the teacher to initiate gifted students into the broad coverage of psychology, sociology, and anthropology. These topics are given as follows:

1. How many ages do you have?
2. If you were put in charge of training men or animals, would you prefer to use reward or punishment?
3. Should an unjust law be obeyed?
4. Consider the school to be a city in miniature. What roles are played by the principal, teachers, and students?
5. Can you make a distinction between "upper class" and "lower class" in a society?

6. Trace man's recreational activity from ancient times to the present. Are there any similarities between past and present?
7. Do plants and animals adapt themselves to their environment by changing structurally?
8. Man attempts to solve his problems by means of devices he invents called folkways. One folkway is shaking hands. Why do we shake hands?
9. How do societies decide who gets what?
10. How are decisions made in primitive or tribal societies?
11. Are we born with inbred pugnacity?
12. An ancient philosopher said that luxury causes war. Do you agree?
13. Most sociologists say that man has always lived in groups. Do you agree with this statement?
14. It has been said that of all the animals in the world. man is the only one who can change his environment to suit himself, and yet he is the only maladjusted animal. Do you believe this statement to be true?
15. Petrified ant hills show that millions of years ago ants acted precisely as they do now. Over the years, however, man has continually changed his behavior. Can you give reasons why the above statement is true?
16. How many societies are you a member of?
17. Man has great need for security, but he also has need for adventure. Do these needs run contrary to each other? If they do, how can they be present at the same time in the same individual?
18. Einstein once said that if his ideas turned out to be good, the Germans would say he was German, and that if they turned out to be bad, they would say he was Jewish. What did he mean?
19. The meeting of the Indian and the white man is often regarded as one of the great tragedies of history because no two races have understood each other less. Do you think the Indian or white man was right?
20. Recently, natives on a Pacific island raised money to buy our President from us. These natives remembered that during World War II American soldiers had arrived with thousands of tons of supplies. The islanders thought that buying our President would bring them more supplies. Do you think that the islanders would give our President god-like status?
21. Discuss the "great man theory." Does history make great men or do great men make history?
22. How can poor communication endanger relations between different groups of people?
23. Can you predict how life would be by the year 2,000?
24. Imagine that the year is A.D. 2300. The class is made up of a team of archaeologists. You are digging on the site of where the school once stood. What are your experiences?

SKILLS BEING DEVELOPED

The large number of topics is presented so that teachers may have a wide selection of topics likely to stimulate creativity, analyses, and evaluation. The topics may be used for reporting, newspaper articles, debates, and plays.

CONTRIBUTED BY

Reprinted with permission from "Teaching Gifted Students Social Sciences in Grades 7-9," California State Department of Education funded by Title V, 721 Capitol Mall, Sacramento, California 95814. (Wilson Riles, Superintendent of Public Instruction, Leslie Brinegar, Paul Plowman, Irving Sato).

NATURAL RESOURCES VALUES

SUBJECT AREA

Science, Social Studies, All

OBJECTIVES

Students will be able to examine qualities of different social facilities and rank them in order of importance.

DESCRIPTION

Students must establish their priorities when choosing what items to develop in an isolated Earth-like environment.

ACTIVITIES

Instructions: You have been sent to a totally isolated Earth-like environment on an asteroid with the following:

A. a population of 1000 people
B. a land area of 10,000 acres
C. 18,250,000 gallons of fresh water annually

You have the materials and know how to develop the following items. Select and number the top 5 priorities in order of importance on the blanks provided below. Give two reasons on the blanks provided for making each of your choices.

Public school system
Building contractor
Insurance company
Fossil Fuel Electric Power Plant
City Government
Bank
Oil Company
Shopping Center
Newspaper
Birth control program
Mining company
Church
Zoning and Land Use Laws
Hospital and Staff
Nuclear Power plant

Pest control program
Farming program
Sewage treatment plant
Police Department
Natural gas company
Guaranteed Parity
Distribution of G.N.P.
Symphony Orchestra and Library
TV and Radio Station
Environmental Consultant
Fertilizer and herbicide production
Ready Mix Concrete Plant
Motor Vehicle production
Plastics Products plant

Choices:

1. ______________________________

Reasons for choice:

a) ______________________________
____
b) ______________________________
____

Minimum Requirement: Each student must have made 5 selections and have given two reasons which will not be judged "right" or "wrong" but must logically support their choice.

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation.

CONTRIBUTED BY

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AIR POLLUTION

SUBJECT AREA

Science

MATERIALS

Given in each experiment. Bibliography at end.

OBJECTIVES

The student should be able to:

1. List the five primary air pollutants.
2. Describe several physical properties for each pollutant.
3. List the natural sources of each pollutant.
4. List the man-made (anthropogenic) sources of each pollutant.
5. Identify correctly the terms related to air pollution.
6. List specific point sources in your community and your home which are contributors to air pollution.

DESCRIPTION

This unit and one on water pollution were done by teachers in a workshop under the direction of Dr. D. J. Baumann, Professor of Chemistry at Creighton University, Omaha, Nebraska. Below is one module of the air pollution unit. The entire unit and the water pollution unit is available by writing the Nebraska Department of Education - Office of Gifted and Talented.

ACTIVITIES

MODULE I Identity, Nature, and Sources of Air Pollution

TASKS:

1. Use available printed and audio-visual materials.
2. Write the name of each pollutant on a separate page in your notebook. You will add additional information for that pollutant as you proceed.
3. For each pollutant: Record in your notebook physical properties such as odor, color, phase (solid, liquid, or gas at room temperature) and solubility in water.
4. The teacher will demonstrate the production of small amounts of sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) gases. Detect the odor cautiously. Record any observations in your notebook.
5. Consult sources. List in your notebook several natural and anthropogenic sources and amounts of each pollutant. Indicate which are contributors to air pollution in your community.
6. Perform one or more of the following five options.
   a. Take pictures of local pollution sources. Prepare a bulletin board display explaining the types of pollutants observed in each picture.
   b. Find in magazines pictures of pollution sources. Prepare a bulletin board display as above.

c. Keep a scrapbook for one month of news items on air pollution. Prepare a short oral report to be given when you turn in your scrapbook

d. Determine the major air pollutants and their sources in your home and community. Write to the state, county, or city health department for information. Report findings to the class and/or student publication.

e. Design and administer with teacher approval a questionnaire concerning public attitude toward air pollution. Give summary report to your class and to the school publication.

7. Recognize and be able to use the following terms:

- absorption
- adsorption
- ambient air
- anthropogenic
- background level
- carbon monoxide (CO)
- chemisorption
- effluent
- fossil fuels
- hazardous air pollutant
- hydrocarbons
- micrograms per cubic meter (g/ m^3)
- oxides of nitrogen (NO_x)
- oxides of sulfer (SO_x)
- ozone
- particulates
- parts per hundred (%)
- parts per billion (ppb)
- parts per million (ppm)
- point source
- source
- viable

Module 1 (To the Instructor)

PREPARATION OF SULFUR DIOXIDE (SO_2)

To a small test tube (13 x 100mm) add a pinch of sodium sulfite (Na_2SO_3). To this add 2 or 3 ml of 0.1 M hydrochloric acid. Cautiously note the odor. If the odor is not immediately detected, warm the test tube gently. Dispose of waste down the drain with plenty of water.

PREPARATION OF NITROGEN DIOXIDE (NO_2)

Carry this out in a fume hood or near an open window. To a few turns of copper wire in an evaporating dish add 5 ml of 6.0 M nitric acid (HNO_3). It may take about a minute or two for the reaction to start. If it does not start, set the dish on a ring stand and heat gently. Cautiously detect odor. Dispose of liquid waste down the drain. Flush with water. Put any unreacted copper wire in the solid waste container.

MODULE I TEST

I. MATCHING: Match the phrases in column B to the list of terms in column A There is one answer for each term.

A. ____1. absorption
____2. viable
____3. effluent
____4. parts per hundred
____5. fossil fuels
____6. ambient air
____7. adsorption
____8. background level
____9. micrograms per cubic meter
____10. chemisorption

B. a. weight per unit volume measurement.
b. not capable of living.
c. amounts of pollution present in the air due to a natural source.
d. physically attracted and held.
e. capable of living.
f. unit of volume measurement sometimes given as a percent.
g. chemical interaction between colliding molecule and particulate surface.
h. remains of ancient plant and animal life.
i. emission of a liquid or gas.
j. unconfined space occupied by the atmosphere.
k. size measurement.
l. dissolved into a particle.
m. none of these.

II. The following is a list of sources of air pollution. After each source state whether it is a natural source or an anthropogenic source. (Example: Diesel engines: Anthropogenic A)

	Anthropogenic (A) Natural (N)	Principal Pollutant(s) Emitted
1. Coal mines	1.____	____________
2. Internal combustion engine	2.____	____________
3. Solvent usage	3.____	____________
4. Leakage in oil fields	4.____	____________
5. Volcanoes	5.____	____________
6. Decomposition of matter	6.____	____________
7. Burning of fossil fuels	7.____	____________
8. Forests	8.____	____________
9. Industrial processes	9.____	____________
10. Reactions between nitrogen and oxygen in the upper atmosphere	10.____	____________
11. Burning waste materials	11.____	____________
12. Insufficient combustion of fuels	12.____	____________
13. Pulverizing of materials by pedestrians	13.____	____________
14. Aerosol spray cans	14.____	____________
15. Marsh gases	15.____	____________

III. Complete the following table. First, fill in the names of the other three major pollutants. Then fill in the properties. If something does not apply, put an X in the space.

NAME	ODOR	COLOR	PHASE	SOLUBILITY IN WATER AT 25°C

IV. ESSAY: Answer the following questions on another sheet of paper provided for you.

1. Identify one point source of pollution in your home and discuss why it is considered to be a contributor to air pollution.
2. Identify one point source of pollution in your community and discuss why it is considered to be a contributor to air pollution.

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INSULATING YOUR HOME

SUBJECT AREA

Science, Social Studies, Math

MATERIALS

Weather data over a three year period, gas and electric bills over a three year period, graph paper, $400 worth of insulation, labor plus materials

OBJECTIVES

Students will be able to:

1. Observe the difference between insulated homes and those which do not have insulation.
2. Gather and organize data and make conclusions based on that data.

DESCRIPTION

This is a description of a project one class conducted to determine what effect additional insulation has on the energy consumed in a residential home.

ACTIVITIES

Problem Statement: What effect does additional insulation have on the energy consumed in a residential home?

Procedure: The best way to get your home insulated would be to obtain bids from several lumber yards, then decide which lumber yard to purchase from. The type of insulation is very important try to obtain a type that will not settle down. The insulation R factor for this investigation was adjusted to an R rating of 32. Record the date the insulation was placed in your home and correlate this with your electric and gas bills. Insulation was added to the ceiling only.

Then plot the following information to better understand the relations that need to be observed.

A. Plot the monthly average temperature vs. the months of each year over the last 3 years.

B. Plot the consumption of natural gas vs. date of months over the last three years.

C. Plot the electrical consumption vs. date of months over the last three years.

D. Plot the electrical bill in dollars vs. date of months over the last three years.

E. Plot the total of electric bill in dollars plus fuel adjustment vs. date in months over the last three years.

F. Plot the cost in dollars of natural gas vs. date of months over the last three years.

G. Plot unit cost of natural gas vs. date of months over the last three years.

H. Plot the cost of natural gas with and without insulation vs. time, vs. date of months over the last three years.

Data Tables:

Date	KPL Gas Consumption	Cost	Water Consumption	Cost	Electricity Consumption (KWH)	Cost	Fuel Adj.
1974							
Oct.	8	6.79	10	6.25	680	21.10	2.00
Nov.	12	9.42	11	6.65	900	25.50	2.00
Dec.	22	16.01	10	6.25	830	22.38	2.00
1975							
Jan.	29	21.24	10	6.25	1180	31.10	--
Feb.	25	18.52	12	7.05	2340	41.25	22.23
March	20	15.53	12	7.05	1500	30.75	13.65
April	16	12.72	10	6.25	1340	28.75	7.91

Conclusions:

1. The average monthly temperature varied from 30°F to 80°C. The temperature for the same month of 1974, 1975, 1976, 1977 and 1978 was about the s[illegible]e value. A person could predict the temperature of each month for the future.
2. The consumption of gas varied from a low of 4.5 units (MCF) to a high of 37 units. The high was during the month of January and the low was during the month of July, August and September. The consumption decreased about 7 units each month after the insulation was added to the house.
3. After September of 1976, the total area heated increased by 484 ft^2 to a total heating area of 1445 ft^3.
4. The total gas energy consumed after adding the insulation was lower than before adding the insulation and an addition 484 ft^2 of space was being heated.

5. The lowest electrical consumption was during the months of October, November, December, January, February, March, April and May. The highest electrical consumption was during the months of June, July and August. The highest electrical bill was for the month of July in 1977.
6. During the months of January, February and March of 1975, an electrical heating system was used to heat the 484 ft^2 in the family room. The consumption rate and electric bill went up to the second highest bill and the electric heating system has never been used since then.
7. During the first year of heating since the insulation was added, the investigator estimates that approximately $122.50 was saved, plus an additional 484 ft^2 of space is being heated. The gas furnace is turned off during the months of July, August and September.
8. The unit price of gas has varied from a low of .73 to a high of 1.85. This gives an increase of 253% from 1975 to September 1977.
9. The consumption rate of gas has decreased since the insulation was added, but the cost is about the same due to the increased unit rates and fuel adjustments.

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation.

CONTRIBUTED BY

Loren E. Riblett, Science Teacher, Wamego High School, Wamego, Kansas 66547.

ELECTRICITY BUDGETING

SUBJECT AREA

Science, Math

OBJECTIVES

Students will be able to calculate the amount and cost of electricity used in their homes.

DESCRIPTION

Have students compute their household's use of electricity and its cost.

ACTIVITIES

Directions: Consider the electrical appliances used in your home and list the number of appliances you have in each category, if any. Fill in the remaining figures called for in the table below and then answer the questions that follow. Caution: be prepared to explain to your teacher how you arrived at your answer.

Appliance	No. in Home	Approx. Avg. hrs. used per day	X30	Approx. Avg. hrs. used per month	X Cost per hr.	Cost Avg. per mo.
Elect. Clock			X30		.004¢	
Elect. Range			X30		3¢	
Light (one 100 watt bulb)			X30		.3¢	
TV			X30		1¢	
Furnace or Air Cond. per room			X30		5¢	
Refrigerator			X30		1¢	
Elect. Radio			X30		.2¢	
Washing Mach.			X30		1¢	
Clothes Dryer			X30		8¢	
Record Player			X30		.4¢	
Vacuum Cleaner			X30		2.5¢	
Exhaust fan per room			X30		.1¢	
Hair dryer			X30		.8¢	
Dish washer			X30		2¢	

Total Cost per month $__________

1. According to your calculations what are the 3 most costly electrical appliances in your home? (based on the costs in the table above).

2. How much money could your family save next year if they watched two less hours of TV per day?

3. How much does it cost to keep a second electric refrigerator running all year?

4. Based on the costs in the table above, how much could a family save in a year by running their clothes dryer 1 hour less per day?

5. Assuming that a freezer costs the same to run as a refrigerator, what would the total yearly savings be if they were to combine the following conservation methods:

   A. One hour less TV per day ________
   B. One hour less clothes drying per day ________
   C. One less freezer or refrigerator ________
   D. One hour less elec. hair drying per day ________
   E. One hour less elec. dish washing per day ________
   Total yearly savings ________

6. Assuming that a holiday lighted tree display contained the equivalent of 20-100 watt bulbs and that it was usually on for 6 hours per day for 40 days, what would it cost?

Minimum score: 5 of 6 correct

SKILLS BEING DEVELOPED

Analysis, application.

CONTRIBUTED BY

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WILLIAMS' GEMS

SUBJECT AREA

Science

DESCRIPTION

Below are a few ideas for activities from Frank Williams' Classroom Ideas for Encouraging Thinking and Feeling, D.O.K. Publishers (full information below). Each specifies which element of creativity is being developed-first its cognitive component, then its affective component. Teaching strategies are also specified.

ACTIVITIES

To Encourage: Original thinking and curiosity
Using: Strategies No. 4 - Discrepancies
No. 6 - Examples of change
No. 14- Evaluate situations

During a unit on transportation a teacher discovered that the class had a great interest in freight trains. The class was divided into research committees each assigned the task of designing a new kind of ground transportation that could replace the freight train and having these features:

1. A train that doesn't use tracks or wheels.
2. Powered by anything except steam or electricity.
3. Cars cannot be rectangular in shape.
4. An improved method of storing, loading, and unloading freight.
5. Run by personnel requiring a whole new set of skills.

To get each group started in its search for a new design, the teacher asked the class to brainstorm all of the present deficiencies or defects in railforad trains as they exist today, getting ideas for their new, more efficient plans of transportation. Reports were made with drawings and specifications showing many clever and interesting designs. At the conclusion the various committees traded reports and evaluated these on uniqueness of design, practicality, and advantages over the present railroad train.

******

To Encourage: Curiosity and complexity
Using: Strategies No. 2 - Attributes
No. 4 - Discrepancies
No. 9 - Skills of search

The class was asked to search for examples of unusual and extraordinary performances in nature. The teacher gave this as an example:

> Because of its size and shape, accoridng to the principles of aerodynamics, the bumble bee should not be able to fly.
> But the bumble bee doesn't know this so he goes ahead and flies anyway!

Look for other examples in nature that run contrary to common knowledge or appear to be impossible. The class searched science books, encylopedias, film strips, science kits, magazines, etc. always being alert to the unexpected and to the significance of what is not known. Some of the thing in nature they discovered as discrepant between fact and actuality were:

the speed of the porpoise,
the sonar system of the bat,
the reciprocating gyroscope of the humming bird,
and the fly walking on the ceiling.

Such discrepancies caused the class to be very inquisitive as they groped for new insights into nature.

****

To Encourage: Flexible and original thinking
Using: Strategies No. 2 - Attributes
No. 3 - Analogies
No. 8 - Organized random search

As a result of children being inquisitive about pollution and some remedies for it, the teacher gave the class this problem to solve: "Suppose you wanted to invent and design a non-returnable yet disposable container for soft drinks; what materials could it be made out of, what size and shape should it be?" The class first set about the task of brainstorming all the kinds of materials that become disposable by eating, dissolving, burning, liquifying, etc. From this list the children began to associate these ideas into their new design of a non-returnable, disposable soft drink container. One clever design was to have a long, cylindrical (straw) shape which would hold 10 fluid ounces of drink in solid state, made out of a dissolvable material. As it was placed in the mouth its contents would turn to liquid as the outer material dissolved--hence no waste!

****

To Encourage: Flexible thinking and curiosity
Using: Strategies No. 4 - Discrepancies
No. 5 - Provocative questions
No. 14- Evaluate situations

The following demonstration was held to stimulate curiosity and convergent thinking: After several moth balls were dropped into a glass of clear liquid, they repeatedly sank and rose again to the top. The teacher asked the class to gain information about the reasons for this phenomenon by asking questions which could be only answered by "yes" or "no" or "maybe." Through this process of inquiry, the class concluded that the liquid was soda pop and that the moth balls, being more dense than pop, sank, gained CO_2 bubbles causing them to be less dense, and rose again. To stimulate divergent thinking, the teacher then asked what other materials could be combined to produce these same effects.

****

To Encourage: Original thinking and risk taking
Using: Strategies No. 9 - Skills of search
No. 12- Adjustment to development

Committees were set up and each chose a different area of special interest in science, i.e., magnetism, electricity, weather, geology, etc. Each committee was asked to research and invent its own "home equipment" for demonstrating some principle of science within a special area of interest. Committees were asked to plan a presentation for the rest of the class and be prepared to lead the class in a discussion and question-answer period. This activity resulted in some serious and inventive preparation.

SKILLS BEING DEVELOPED

Below is a list of Frank Williams' teaching model:

PUPIL BEHAVIORS

Cognitive	Affective
Fluent thinking	Curiosity (Willingness)
Flexible thinking	Risk Taking (Courage)
Original thinking	Complexity (Challenge)
Elaborative thinking	Imagination (Intuition)

TEACHER BEHAVIORS

Paradoxes
Attributes
Analogies
Discrepancies
Provocative Questions
Examples of Change
Examples of Habit
Organized Random Search
Skills of Search
Tolerance for Ambiguity
Intuitive Expression
Adjustment to Development
Study Creative People & Process
Evaluate Situations
Creative Reading Skill
Creative Listening Skill
Creative Writing Skill
Visualization Skill

CONTRIBUTED BY

Reprinted with permission of D.O.K. Publishers Inc., 71 Radcliffe Road, Buffalo, New York 14214. From Classroom Ideas for Encouraging Thinking and Feeling (1970, $7.50) - Frank E. Williams.

MEEKER PH

SUBJECT AREA

Science

MATERIALS

1. Beaker, water, food coloring
2. Ammonia
3. Very diluted Ammonia, Phenolphthalein
4. Hydronium Paper - various numbers
5. Large glass tube, 3 ft., cotton, Ammonia, Hydrochloric acid

For #1 set the beaker full of water on the table. Let the water become absolutely still. Place one drop of food coloring in the water and let it stand.

For #2 let a jar of ammonia stand open on the table. Let the smell spread throughout the room.

For #3 place the diluted ammonia in a large beaker. Add several drops of phenolphthalein. Let the color spread throughout the beaker.

For #5 soak the cotton in ammonia and place it in one end of the tube. Soak the other piece of cotton in HCl and place it in the other end of the tube. Where the vapors meet a white ring should form.

OBJECTIVES

The students will be able to develop the ability to produce varied implications from given symbolic information.

DESCRIPTION

Allow students to experiment, hypothesize, inquire with phenomena such as those below.

ACTIVITIES

Demonstrate the experiments or have students perform the demonstrations.

The student must understand the major objectives of each demonstration relating to molecular diffusion or mlecular motion.

Discuss pH factor test. Test other objects or solutions. Allow students to guess what color change will occur prior to test.

SKILLS BEING DEVELOPED

Divergent production of symbolic implications.

CONTRIBUTED BY

Reprinted with permission from SOI Abilities Workbook-Divergent Production, Mary Meeker, SOI Institute, 214 Main, El Segundo, California 90245.

SUBJECT AREA

Science, Social Studies

OBJECTIVES

Students will begin to predict conditions of the future by carrying out activities which deal with the future.

DESCRIPTION

Many leaders in education foresee the importance of anticipating and dealing with conditions in the future. Here are some activity ideas dealing with the future.

ACTIVITIES

1. Write four headlines for the year you reach 35 years of age. Write news articles for one of these headlines.
2. Design a class newspaper for a class of students your age in an IGC or SPE class in the year 2000.
3. Illustrate and describe the device which will take you to work at age 45.
4. Write a short science fiction story about life on a space station, a lunar installation, or an inter-planetary space ship.
5. Describe at least 6 potential uses of the computer. List the advantages and disadvantages for at least two of these uses.
6. Pick at least one invention which will be commonly owned by the year 2000 and explain how it will make life different then (e.g., the telephone with a picture screen).
7. Make up a universal language that is simple enough to teach all human beings and that can be sent through space.
8. Create a labor-saving device. List its advantages and disadvantages and explain its uses.
9. Design a rapid transit system to be used in your area in the year 2000.
10. Design the school and classroom of the future.
11. Examine present architectural designs in housing and building structures. Conduct an interview with an architect concerning new building materials, present restrictions which prevent their use now. Design a model home or building for the year using these new materials and an innovative design.
12. Create and display posters dealing with various futuristic themes.

13. Research one or more inventors and their inventions. Discuss and/or illustrate the impact this invention has had on our society and the world.

14. Design a model, draw and/or write a description of a city that is underwater, underground, domed, in space, or in a skyscraper. Show where people work, live, shop and how they move from place to place.

15. Collect articles from the newspapers and magazines that foretell of future discoveries and inventions: foods, medicines and cures, electronics, education, transportation, housing. Explain how each will effect your life.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation

CONTRIBUTED BY

Gifted/Talented Education, November, 1977, "Creating Alternative Visions." Also Ms. Kathleen Schoonmaker, Norwalk, Virginia.

SCIENCE OPPORTUNITIES

The following awards and programs are opportunities for students who excell in the area of science.

BAUSCH & LOMB SCIENCE AWARD & SCHOLARSHIP PROGRAM

OVERVIEW

This is a two stage award program. The first award is a medal given the school to award an outstanding senior. The school's winner of this award may enter the Science Scholarship competition.

Any accredited high school is eligible to participate. (Junior colleges may use the Award at graduation, but winners are not eligible for Scholarship competition.)

The school must have successfully completed at least three science courses and proved outstanding. It is the responsibility of the faculty to chose the winner.

OBJECTIVES

To assist and encourage those young people who have shown an aptitude for scientific subjects and who recognize the opportunity for a full and useful life which a scientific career affords.

TARGET STUDENTS

Age/grade range: High School Seniors; Subject area: Sciences

CONTACT/DIRECTOR

Science Award Committee, Bausch & Lomb, One Lincoln First Square,
Rochester, New York 14601

Explanatory booklet available.

EARTHWATCH SCHOLARSHIP PROGRAM

WHAT IS EARTHWATCH?

EARTHWATCH is a national effort to mobilize citizens in support of science. Research expeditions in the natural sciences, social sciences, and marine sciences all need funds and people to accomplish their objectives. EARTHWATCH supplies the research assistants and the funds needed, using the collective contributions and avocational skills of members of the public.

WHAT IS AN EARTHWATCH SCHOLARSHIP?

EARTHWATCH SCHOLARSHIPS are opportunities for youth to participate in research expeditions in various disciplines. In order to engage more young people in the field, a competition is held nationally each fall to find students with a special aptitude for creativity, leadership, research and discovery. The costs associated with the program are underwritten, in whole or in part, by foundations, corporations, public agencies, and other participating organizations.

WHAT IS THE PURPOSE OF THE PROGRAM?

The program has several objectives. It is designed to foster the career development of youth by challenging them with profound learning experiences in the company of professional scientists. It is gauged to identify promising young men and women early enough in their educational development so that participation in field research projects will give their lives new career focus. It provides students with practical experience and problem solving apprenticeships that are not available in schools.

WHAT KINDS OF EXPEDITIONS ARE INVOLVED?

Research expeditions are working experiences under the direction of professional scientists, not educational field trips. They each have objectives to accomplish and problems to solve. All hands work as a team. Teams are small, ranging from 5 to 20 members. The majority operate under bivouac conditions and remain in the field for 2 to 4 weeks. The scientists usually stay longer. Some projects involve more students than others.

WHO CAN APPLY?

You are eligible to apply for an EARTHWATCH SCHOLARSHIP if you are between the ages of 16 and 23, on January 1 of the year in which you apply. You do not have to be in school to win a scholarship. Your application must demonstrate that you have a keen mind, agile imagination and a unique capability for research and discovery which give you exceptional potential in your field of interest.

Parents and students not eligible for scholarships may also apply to participate by writing EEI, 10 Juniper Road, Box 127, Belmont, Massachusetts 02178. Those accepted must share costs. Interested teachers may apply to EEI for an EARTHWATCH FELLOWSHIP.

SCIENCE TALENT SEARCH
WESTINGHOUSE SCIENCE SCHOLARSHIPS AND AWARDS

ELIGIBILITY

Any boy or girl who is in the last year of secondary school (public, private, parochial) in the United States and Puerto Rico, who is expected by the certifying school official to complete college entrance qualifications before October 1 of the student's senior year, and who has not competed in any previous Science Talent Search, is eligible to enter this competition.

Age-There are no age limits in this competition.

REQUIREMENTS

1. Each student must submit a report of about 1,000 words on an independent research project in the physical sciences, engineering, mathematics, biological sciences (excluding live vertebrate experimentation), or behavioral sciences.

2. Each entry must include a Personal Data Blank and secondary school record filled out by the student, his teachers and principal.

3. The secondary school record MUST include available national test scores, i.e., National Education Development Tests; Preliminary Scholastic Aptitude Test/National Merit Scholarship Qualifying Test; College Entrance Examination Board, etc.

4. No project involving live vertebrate animal experimentation will be eligible. Projects involving human beings, and those on behavioral observations of animals in their natural habitat are excluded from this ruling and are eligible.

5. the project MUST be the work of a single individual. Group projects are not eligible.

6. A student who has attended a Summer Science Training Program and has used material from that experience as part of his project, MUST submit a statement from the Director of the SSTP giving descriptive and explanatory evidence of independence and creativity.

7. All entries must reach the offices of Science Service, 1719 N Street, NW, Washington, D. C. 20036, not later than midnight, December 15, of the student's senior year.

SCHOLARSHIPS AND AWARDS

Forty contestants with highest talent as judged by a judging committee on the basis of a science or engineering project report, scholastic and personal records, and any other information assembled by the judges, will be awarded invitations to the Science Talent

Institute and all-expense-paid trips (transportation, hotel and other arranged expense paid) to the place the Institute is to be held and return. It is planned to hold the Science Talent Institute in March in Washington, D.C. All contestants invited to the Science Talent Institute will receive the Gold Emblem of Science Clubs of America.

Ten of the contestants coming to the Science Talent Institute will be selected by a board of judges to receive four-year Westinghouse Science Scholarships. Scholarships consist of one $10,000 ($2,500 per year), two $8,000 ($2,000 per year), three $6,000 ($1,500 per year), four $4,000 ($1,000 per year).

Westinghouse Science Awards of $250.00 each will be awarded to the other 30 contestants.

An Honors Group will be named.

Committees of judges designeated by Science Service will judge the contest, and the decisions of these judges shall be final in all cases. Judges include specialists in the field of biology, chemistry, physics, mathematics, engineering and psychiatry.

STATE CONTACT

Dr. Paul Larsen
Wesleyan University
50th & St. Paul
Lincoln, Nebraska 68504

STUDENT SCIENCE TRAINING
FOR HIGH-ABILITY SECONDARY SCHOOL STUDENTS

PROGRAM OBJECTIVES

Student Science Training (SST) is one of the six programs comprising the National Science Foundation's Student-Oriented Programs (SOP). It shares with other program elements the basic goal of providing talented students with science learning opportunities above and beyond those normally available in most formal science education programs in the Nation's schools and colleges.

A secondary goal of SST is that of recognizing the capacity of students to be motivated by a measure of independence in their studies and thus to accept greater responsibility for planning and carrying out their own learning activities.

To provide experiences beyond those normally available to students, the Foundation supports the active participation of students with college faculty in specially designed instruction and investigative work. In the various types of projects, the role of the faculty ranges from central to advisory, but in all cases the projects should stress increasing independence and responsibility for the student.

Student Science Training is characterized by the following features:

-Involves instruction, research participation, or an appropriate blend of the two, through which highly talented secondary school students come into direct contact with college teachers, research scientists, or engineers for an educational experience that goes beyond those normally available in high school or early college courses;

-Brings the instructional resources of universities, colleges, and research organizations into the academic preparation of these talented students significantly earlier than the educational system ordinarily permits;

Supports two broad categories of projects-

1. Those designed for the educational development of high-ability students from secondary schools in which science instruction is, by national standards, excellent.

2. Those especially designed for students with limited educational opportunities. These are for students who have demonstrated high potential, but in whose secondary schools the science training is deficient because of inadequate facilities or instruction. More emphasis will be placed on projects oriented primarily toward students with limited educational backgrounds in FY 1978.

For information about specific SST programs available eacy year, write National Science Foundation, Washington, D.C. 20550. Also in this booklet, Laboratory Chemistry.

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STAR AWARDS
SPONSORED BY THE AMERICAN GAS ASSOCIATION

AGA-NSTA SCIENCE TEACHING ACHIEVEMENT RECOGNITION
CONDUCTED BY THE
NATIONAL SCIENCE TEACHERS ASSOCIATION
WASHINGTON, D. C. 20009

The Science Teaching Achievement Recognition (STAR) Awards Program emphasizes both achievements (something that has been done or tried, a novel idea that has been put to the test in practice) and projections (innovative planning and creative thinking, novel approaches aimed at future progress and improvement in science education) in science education at elementary and secondary (pre-college) levels. All members of the science teaching community are eligible to enter.

RULES AND PROCEDURES

(1) The entry must be typed, double-spaced, on 8½ x 11 pager.

(2) The paper should not exceed 3,000 words; photographs and other supporting materials should be appended.

(3) The strength of a report is enhanced by a bibliography and indications that pertinent literature has been surveyed.

(4) Submit three copies of your entry.

(5) Closing date for submission of entry: Decmeber 1st.

CRITERIA FOR JUDGING

(1) Resourcefulness, creativity, and originality.

(2) Evidence of effectiveness of what was tried, or supportive argumentation for proposed innovations.

(3) Completeness in conception and presentation.

(4) Applicability or adaptation possibilities.

AWARDS

The STAR program offers a top award of $1,000 and additional awards of $500 and $250. Winnders receive recognition medallions.

Introduction of winners and presentation of awards will take place at the NSTA National Convention.

GUSTAV OHAUS AWARDS
...FOR INNOVATIONS IN COLLEGE SCIENCE TEACHING

SPONSORED BY THE OHAUS SCALE CORPORATION

CONDUCTED BY THE
NATIONAL SCIENCE TEACHERS ASSOCIATION
1742 CONNECTICUT AVENUE, N.W.
WASHINGTON, D. C. 20009

GUIDELINES FOR SUBMISSION OF ENTRY

Teachers of undergraduate-level science are invited to submit papers expressing their ideas of how science teaching can be made more effective. This program is a quest for new designs for courses and curricula, new instructional methods, new organizational and administrative patterns, new approahces to laboratory activities, and other innovative revisions--particularly as related to the teaching of science for non-science majors in the two-year colleges and in the lower division of four-year institutions.

RULES AND PROCEDURES

(1) The entry must be typed, double-spaced, on 8½ x 11 paper.

(2) The paper should not exceed 3,000 words; photographs and other supporting materials should be appended.

(3) Submit three copies of your entry.

(4) Closing date for submission of entry: December 1st.

Papers are judged by a panel of educators. Their decisions are governed by originality of thought and clarity of expression. Papers will be considered for publication.

AWARDS

The Ohaus program offers a top award of $1,000 and additional awards of $500 and $250. Winners receive recognition medallions.

Introduction of winners and presentation of awards will take place at the NSTA National Convention.

SCIENCE AND ENGINEERING FAIRS:
GUIDELINES FOR SCIENCE LEARNING FAIRS

RATIONALE

High schools searching for alternative pathways to learning may provide a sequence of activities culminating in student-centered fairs. These fairs provide the student an opportunity to present, rap with other students and share ideas with judges and other interested professionals in the scientific community.

Within this sequence the educational system has provided a learning environment for all students as well as a system of competitive fairs for the more proficient student. Without an opportunity such as this, our "top" students are frequently robbed of opportunities to grow. This robbery may take many forms such as:

- the student misunderstanding his true potential,
- the student's lack of need to redefine communication skills,
- the student's imbalanced value system relative to intellectual activities,
- provincialism.

Regional and state science fairs are not for everyone. But without an opportunity for "top" students to move up, "average" students may accept mediocre as an acceptable role in school. This statement does not imply that other students should not be involved in local and school fairs. Often students in these fairs present projects which do have value in science education, and consideration should be given to the category of disply (criteria C below.)

A pupil presenting a science project is truly a student. For within the preparation period, the student becomes personally involved in answering a multitude of whats, whys, and hows related to a specific phenomenon. The student has an opportunity to extend himself via researching resources and planning a successful presentation.

How does a senior develop an intellectual growth and confidence at an early age? In elementary school the student is provided opportunities to discuss and exhibit models of scientific concepts with classmates. This background provides ideal learning situations as well as preparation training for school-wide fairs during middle school or early junior high years. These fairs should provide the student opportunities to grow beyond the presentation of fundamental concepts toward the formulation of personal research projects. During these fairs, the criteria of student involvement and growth was foremost in the minds of the fair's organizers and judges. By the time the student is old enough to enter regional fairs, he has developed presentation skills as well as interests which can serve as a sound background for placing his ideas in competition with others.

Differentiation of Values On Experiences at Various Levels

	Class Projects and Presentations	Class Fair	School Fair	Local Fair	Regional Fair	State Fair	International
9 - 12	C	D-E	E	E	E	E	E
Junior High	C	D	C-D	C-D			
Middle	B	B	B				
Elementary	A	A					

Criteria	A	B	C	D	E
Creative Ability	5	10	10	20	30
Science/Engineering Goal	10	20	20	25	30
Thoroughness	20	20	20	20	15
Skill	5	10	20	20	15
Clarity	20	20	20	15	10
Dramatic Value	40	20	10		
Personal Involvement			(throughout)		

These criteria are utilized for the purpose of judging in order to select first, second,...place winners in regional and state fairs. In local or school fairs, consideration should be given to the expansion of categories to provide additional avenues for success. In fact, for the younger students in elementary school, success should be of prime importance and the criteria utilized only in the directions of emphasis given the student. Each of these budding students should receive equal recognition (ex. certificate of participation).

SCIENCE EXPERIMENT TOPICS

The following lists consist of topics for possible individual investigation in science.

SCIENCE EXPERIMENT TOPICS

JUNIOR HIGH

1. Solar Energy to Run the Home
2. The Future Moon
3. Earthquake Prediction
4. Beef By-Products, Pharmaceuticals
5. Plate Tactonics
6. What is Mars Really Like?
7. Bacteria - Ultra Violet Rays
8. Air Pollution
9. Growing - Cooling - Heating - Bacteria
10. Difference & Comparison Between Dicots & Monocots with Gibberellic Acid

11. Do Fish React to Environmental Change?
12. Cardiopulmonary Resuscitation (CPR)
13. The Effects of Aspirin on Gerbils
14. The Affects of Salt Water on Radish Seeds
15. Grafting Green Corn Leaves on Albion Corn Plants
16. Physical Fitness
17. Dicot Growth in Glucosa Solution
18. Effects of Oxygen on Plants
19. How Can I Identify the Atom?
20. Kinds of Electricity

21. Light-Communications
22. Drills and Drilling
23. Comparison of Antacids
24. My Application of Solar Energy
25. Magnetism of Iron Filings
26. Electrostatics
27. The Study of Water
28. The Level of Concentration
29. Telegraph
30. What is Magnetism?

31. Photocell Street Light and Alarm
32. Telegraph and Recorder
33. Faraday's D.C. Generation
34. Computers--Today's Wonder Machines
35. Electronic Beeper Bug
36. The Workings of a Telegraph
37. Electricity
38. Everything You Always Wanted to Know About Batteries
39. The Electrical Conductivity of Different Solutions
40. Electric Motor

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41. Dams: How and Why
42. Soil Erosion
43. Land Erosion
44. Conservation of Beaver
45. The Balance of Nature
46. Soil Conservation
47. Air Pollution: What It Is, Where It Comes From, And How It Hurts You
48. Should Wild Animals Be Protected?
49. Cause and Prevention of Erosion
50. Air Pollution

51. Garbage Solutions
52. Model of a Lunar Eclipse
53. Weather Maps: The Meteorologist's
54. Forms of Clouds
55. What is the Structure of a Volcano
56. How Does a Seismograph Work?
57. Hurricanes and How They Work
58. Fossils: What Are They and How Are They Formed?
59. Weather Maps and Symbols
60. What are the Different Types of Volcanoes?

61. Effects of Glacial Erosion
62. The Active Volcano
63. A Homemade Camera
64. Rocketry
65. Does A Real Barometer Match A Homemade One?
66. Pyramid Power
67. The Principles of Expansion and Contraction
68. The Use of Simple Machines
69. Testing the Durability of Concrete
70. Recording Baronmeter

71. Holograms--Today's New 3-D Photography
72. Building a Low Budget Thermograph
73. Wind Generator
74. Water's Surface Tension
75. Strength of Glue
76. The Study of Water
77. Comparison of Antacids
78. How Does a Catalysis and Comustion Work
79. Distillation of Wood
80. Distillation of Natural Gas

81. Combining Oxygen and Iron
82. Precipitate Reactions
83. Acid Test in Liquids
84. Periodic Table
85. How Different Detergents Work on Different Stains
86. Which Detergent Works the Best in Our Water?
87. A Simple Calorimeter
88. Printing Pictures with Simple Tools
89. Extraction of Ammonia from Coal
90. Porperties of Metals

91. What Really Happens to a Material When It Burns?
92. Tar and Nicotine Test
93. Analysis of Body Measurements in Determining Wrestling Weights
94. What is a Heart Attack?
95. Do You Have High Blood Pressure?
96. What is Alcohol and How Does it Affect Us?
97. Alcohol and the Effects it Has on the Human Body
98. Heart
99. Sense Organs
100. Acupuncture

101. The Daily Diet
102. Cancer Caused by Smoking
103. Smoking and Health
104. The Human Teeth
105. A Model Solar Home
106. Solar Oven
107. What Temperature is Best for Solar Distillation
108. The Temperature Differences A Solar Energy House and A Conventional House
109. Heating a Swimming Pool with Solar Energy
110. Solar-Powered Pendulum Clock

111. Solar Water Heater
112. Pyramid Power--Fact or Fiction
113. Dams and How They Work
114. How is Petroleum Found and Processed?
115. Rocket Fin Design
116. A Pinhole Camera
117. Effects on Different Oil Used on an Engine
118. Radio Waves
119. Growing Crystals
120. The Use of Fingerprints in Crime Detection

121. ESP or Lady Luck
122. Crystal Growing
123. The Role Inheritance Plays in Fingerprints
124. Radiant Heating System
125. Fingerprints
126. Is Your Water Fit to Drink?
127. Aflatoxin on ZFA Mays Pro Produced by Aspergillus Flarus
128. How Rust Effects Plants
129. Bacteria: More Harmful or Helpful
130. The Effect of Toothpaste on Bacteria

131. Morphology and Growth of Fungi
132. Growing Bacteria and the Affects of Temerature on It
133. Common Types of Fungi
134. Slime Molds
135. Chemical Action in a Plant
136. Competitive Growth of Algae
137. Plant Tropisms
138. Plant Germination Under Light
139. The Effect of Light on Oscillatoria
140. How Does Light Effect Chorophytum?

141. Variables Affecting Plant Growth
142. Effect of Colored Light on Plants' Growth
143. The Effects of Different Colored Lights on Euglena
144. Can Photosynthesis be Stopped?
145. The Effect of Plant Growth with Different Amounts of Light
146. Effects of Excessive Amounts of Oxygen and Oxygen Deficiency on Growth of Radish Seeds
147. Would Human Emotional Displays Effect the Growth Rate of Carrots?
148. How does Fertilizer Affect Plant Growth?
149. How Does Corn Grow When Fertilizer is Placed at Different Depths?
150. The Effects of Different H_2O on Plants

151. Methods for Watering Plants-Do They Make a Difference
152. The Effects of Different Methods of Irrigation on Growth of Corn and Soybeans
153. The Potted Farm
154. Fertilizers--What Can They Do?
155. Effects of Fertilizer on Carrots
156. Nitrogen and Phosphoric Effects on Cactus
157. How to Make a Successful Terrarium
158. Parts of a Plant
159. Air Pollution--Pollution Solution--The Effect of Air Polution on Plants
160. Plant Feeding

161. The Effects of Daily Consumed Liquids upon Plants
162. Effects of Acids, Base, and Salt Solutions on Plant Growth
163. How to Grow a Plant--With Soil, Without Soil
164. How Different Substances Affect the Growth of Radish Seeds
165. Growing Plants with the Use of Chemicals
166. Dicot Growth In Glucose Solution
167. The Effects of Detergent on Plant Growth
168. Diesel Engines
169. Model Rockets
170. Traps

171. Optical Illusions
172. A Model of a Natural Gas Well
173. Water Cycle
174. Dinosaur
175. The Solar System
176. How Will the Space Shuttle Be Used?

177. A Model of Our Solar System
178. Dinosaurs and Their Environment
179. Can Fish Sense Warm and Cold?
180. The Effects of Aspirin on Gerbils

181. Dissecting a Frog
182. The Effects of Vitamins on Gerbils
183. What is the Nature of a Fox Squirrel?
184. The Turning Reaction of Nightcrawlers!
185. Baking Soda, Does It Work? And Does it Make A Difference?
186. Pesticides and Herbicides, Are They Really Worth It?
187. Study of Frogs
188. Artificial Insemination of Cattle
189. The Social Life of Ants
190. Rodents and Mazes

191. How Do Goldfish React to Alcohol?

SENIOR HIGH

1. Observing Chladni Figures
2. Tesselations & Dissection
3. Filling Space with Isometric Solids
4. Operant Conditioning of a White Rat
5. The Amount of Acids & Alkalines in Various Foods
6. A Study of Seasonal Variation in Coliform Count
7. The Effects of Monochromatic Light upon Drosophila
8. The Effect of Using the Preferred Hand in Weight Judgment
9. Life in a Drop of Water
10. The Effects of Diet in Diabetic Rats

11. Length of Intestine and Enzymes Pattern in Tadpole and Frog
12. The Control of Abscission
13. Is Blood Coagulation Affected by Aspirin?
14. Dissolved Oxygen Content in Algae Cultures
15. The Effect of Alcohol on Gerbils
16. Detergent Phosphate and Algal Growth
17. Bleaching of Euglena gracilis
18. Characteristics of a Polluted Pond
19. Nitrates in Water Supplies
20. Caffeine's Effect on Mammals

21. The Effect of Soda Pop Acid on Different Kinds of Metals
22. The Amount of Acids and Alkalines in Different Types of Foods
23. Protein Hydrolysis by Plant Enzymes
24. Specificity of Lectins
25. Effects of Soap on Bacteria
26. The Effects of X-Ray Radiations on Escherichia Coli Bacteria
27. Local Water Supply Analysis
28. Determining the Effect of Concentrations of Detergent on the Growth of Beans
29. Effects of Light on Plant Growth
30. Induction of Colchicine to Produce Polyploidy

31. The Effect of Magnetism on Plant Growth
32. Geotropism
33. Effects of Light on Plant Growth
34. Soilless Plant Culture Using Agar-Agar
35. Solar Energy to Run the Home
36. A Model of Thomas Savery's Steam Engine
37. Free Fall and Projectile Motion
38. Solar Heating
39. How Airplanes Fly
40. The Visible Air Machine

41. Aerodynamics of High-Speed Aircraft
42. Determination of Acceleration of Gravity
43. Holography-Photography in 3-D
44. Infrared Photography
45. Crystals and Light
46. Spectroscopy
47. Spectrum Analysis
48. Synthesis of Aspirin
49. Treatment of Different Kinds of Stains
50. The Effects of Physical Activity on the Metabolism of Mice

51. Developing and Preserving Chicken Embryos
52. Is Intelligence in Planaria Regenerative?
53. Chromosome Study
54. Temperature Effect on Fruit Flies
55. Studying WMF Characteristics in Drosophila
56. The Effect of an Artificial Hormone Upon Cull Hens
57. Man and His Natural Resources
58. Water, Nebraska's Most Valuable Resource
59. Testing Intelligence by Harris-Goodenough Test
60. A Solar Home

61. Conservation of Water and The Water You Drink
62. Freshness and Florescence
63. Crystals and Crystal Growing
64. Water Pollution Testing in Your County
65. Is There a Home Field Advantage in College Football?
66. Dreams--The Revelation of the Inner Mind
67. Anorexia Nervosa
68. Disappearing Ozone
69. Plastics
70. Blood

JOINT MATH-SCIENCE PROJECTS

1. Space/Time - Astronomy
2. Population - Ecology
3. Consumer Science (Chemistry, formulas, recipes)
4. Symbolic Logic
5. Machines, Levers
6. Energy, Water, Transportation
7. Calculators, Computers
8. Geometries

1977 GREATER NEBRASKA SCIENCE AND ENGINEERING FAIR

SENIOR HIGH

1. Spatial Perception of Sound
2. Caffeine's Effects on Mammals
3. Bioelectricity
4. Is Intelligence Regenerative in Planaria
5. The Effects of Alcohol on Gerbil Hearts and Livers
6. The Effect of Smoke on the Development of Chick Embryos
7. Pteridines in the Eye Pigments of Insects
8. Detergent Phosphate and Algal Growth
9. Is Blood Coagulation Affected by Aspirin
10. Components of Living Matter from Inorganic Materials

11. Local Water Supply Analysis
12. Enzymology: The Role Certain Enzymes Play in Chemical Reactions of Catabolism
13. Paleobotany: A Study of Seeds from Pitfills of Early Indian Sites
14. The Effect of Snow H20 and Tap H20 on Avena Sativa
15. The Control of Abscission
16. Characteristics of Irradiated Seedlings
17. Do Plants have a Preference
18. Plant Germination and Detergent
19. Common Grasses and Their Growth
20. Exercise with Plants

21. A Comparative Analysis on the Elasticity of Glue
22. Generation of Electricity by Combined Chemical Reactions in a Fuel Cell
23. A Quantitative Analysis of Particulate Contaminants in Auto Exhaust
24. Making Fabrics Flame Resistant
25. Magnetic Resonance Spectrometer
26. Rendezvous with Pollution
27. Stable Orbits around Double Stars
28. Characteristics of a Polluted Pond
29. Improving Truck Aerodynamics
30. The Reduction of Engine Noise

31. Increasing Lift Through the Construction of Slots in a Wing
32. Measuring Insulator Efficiency
33. The Applications of theWind Tunnel
34. A Video Communications Link
35. Heart Rate Monitor
36. Solar Cooling
37. Converting Heat into Mechanical Energy
38. Experiments with Solar Heating
39. A Computer Simulations of Racquetball Strategy
40. Perpetual Calendar

41. Determining Queue in a Supermarket
42. Tesselations and Dissection
43. Geometric Forms in Architecture
44. The Use of a Difference Tone as an Effective Masker
45. The Effects of Noise on Blood Pressure
46. The Effect of Mycotoxins on Gerbils
47. A Study of Leukemia
48. Nitrates in Well Water
49. The Effects of Diet in Diabetic Rats
50. Food Spoilage

51. The Effects of Mouth Wash on Bacteria from the Mouth
52. Pathological Studies of the Effects of Drugs on the Glands and Tissues of Argiope
53. What is Mononucleosis
54. Affect of Nicotine on Chromosomes
55. Specificity of Lectins
56. Environmental Effect on Soil Antibiotics
57. Bleaching of Euglena Gracilis
58. In Waksmans Footsteps
59. The Effect of Marigolds on Nematodes
60. Pathogenic Fungi in the Rhizospheres of Seedlings

61. A Study of Seasonal Variation in Coliform Count
62. Biodegradation of Phenol by a Pseudomonas putida Strain
63. Duration of Immunity of Bordetella Bronchiseptica Antigen in Mice
64. The Effects of Cigarette Paper Filtrace on Paramecium
65. An Acoustical Analysis of a Corrugated Pipe
66. Transmission Characteristics of Light Through Glass
67. An Experimental Determination of the Effects of Temperature on the Pitch of a Stretched String
68. Design and Construction of a Stereoscopic Viewer for Bubble Chamber Film
69. Transistor Characteristics at High Temperatures
70. Electrostatic Induction Motor

71. Holography
72. Parallel and Series Circuits
73. Stop Action Photography
74. High Resolution Lunar Photography

JUNIOR HIGH

1. A Study of Mnemonics
2. The Effects of Sound on Concentration
3. Effects of Preconditioning on Perception
4. How the Environment Effects Rats
5. Investigation of Spider Webs
6. Dreams
7. RNA What Is It?
8. Grafting Green Corn Leaves on Albino Corn Plants
9. The Effect of Magnetism on the Growth of Seeds
10. How Does Light and Fertilizer Affect Plant Growth

11. Does The Temperature of Water Affect Plant Growth
12. Corn Germination
13. Natural vs Artificial Light
14. Does Different Color of Light on Plants effect Highth and Greenness
15. How Does Vinegar Effect Plant Growth
16. How Do Monocot and Dicot Seeds Differ at Various Stages of Growth
17. The Effect of Seed Treatment on Germination and Plant Growth
18. Does Electricity Effect Plant Growth
19. Experiments with the Bread Mold
20. Vitamin B6 Growth Stimulator

21. Plant Growth by Stimulation
22. How Does Electricity Affect Bean Plants
23. Alfalfa Sprouts
24. Making Water Wetter
25. Precipitates
26. How Do Eggs Affect a Cake
27. Glue From Milk
28. Detergents and Bleaches
29. Methane Generation from Livestock Waste
30. Chemical Equilibrium

31. Is Your Oil the Best
32. One Coat Covers
33. Wine Making
34. Crystals and Their Importance
35. Earthquake Predicting
36. Controlled Evaporation
37. Does the Width of Rings in a Tree Vary with the Amount of Yearly Rainfall
38. How Much Water Does Different Types of Soil Hold
39. How Does Temperature Effect the Perculation of Water Through Soil
40. Geothermal Energy Is It Practical

41. Nephascope
42. Sleeping Lion or Ferocious Kitten Cat Alytic Converter
43. Tornadoes Hurricanes
44. Solar Energy
45. Clouds
46. Sun Charging
47. What Water Corrodes Metal Faster
48. Solar Water Heating
49. Systematic Carburetion
50. The Light Reaction Hovercraft Robot

51. Solar Powered Boat
52. Solar Heat by Forced Air Method
53. Weather Effects on Solar Power
54. The New Solar Heating Methods
55. Communication by Light
56. The Solar Furnace
57. Saving with the Sun Solar Energy
58. Simple Computer Circuits
59. Computers
60. The Idiot Box Investigation

Normal day, let me be aware of the treasure you are. Let me learn from you, love you, savor you, bless you before you depart. Let me not pass you by in quest of some rare and perfect tomorrow. Let me hold you while I may, for it will not always be so. One day I shall dig my nails into the earth, or bury my face in the pillow, or stretch myself taut, or raise my hands to the sky and want, more than all the world, your return.

author unknown

Activities for Integration

ACTIVITIES FOR INTEGRATION

Many of the following activities may be integrated into the various subject areas in order to broaden the scope of the course.

The Arts - Activities which can enrich your subject with art, music, or movement as well as art activities in their own right. There are also some media ideas for reporting content such as slide-making.

Personal/Social Growth - A curriculum can be enriched by these types of activities which will aid motivation and personal involvement on the part of the student. Many are important as "boundary breakers" to open students to divergent ideas and thinking.

Problem Solving - Here are a few mind benders to keep eager minds working.

Miscellaneous - These are a few strategies which could be applied to almost any area and should not be left out.

SUBJECT AREA

Language Arts, Art

MATERIALS

Reproductions of colorful works of abstract or interpretive art. Suggested artists: Paul Klee, Willem de Kooning, Jackson Pollock, Georgia O'Keeffe, Clifford Still, Paul Jenkins.

OBJECTIVES

To enhance the awareness of visual art by creative, emotional, intellectual viewing and to also introduce famous artists.

DESCRIPTION

Students view works of art, interpret and apply to creative writing.

ACTIVITIES

(Can be done in groups of 2-3 or by one student) work of art is selected and the following sheet of directions given each student or group of students.

A. Observe work by artist closely. Jot down responses obtained by brainstorming.

   1. Study as a whole. View from all sides. Turn upside down and around. Note anything seen or suggested.

   2. Study textures - imagine feeling texture with hand (rough, chalky). Imagine tasting. Imagine feeling or experiencing brush strokes (smooth, forceful). Imagine watery, flowing colors.

   3. Study color. What emotional responses do colors evoke? (Intensity, melancholy, excitement). Note variations of same color, rhythm, flow, graduations, subtleties or boldness.

   4. Study symbols, forms, lines.

B. Imagine you are as small as an insect. Take an imaginary journey over picture's surface and describe your journey.

C. Imagine picture projected onto huge 10-12 foot canvas on wall. How does that make you feel?

D. Create a descriptive or interpretive paragraph, poem, essay or dream inspired by your response to the work of art.

E. Share with class.

Tips for Teachers:

Brainstorming probably works best in groups, and creative writing alone.

SKILLS BEING DEVELOPED

Analysis; Synthesis; Evaluation

CONTRIBUTED BY

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MUSICAL FANTASIES

SUBJECT AREA

Language Arts, All

MATERIALS

Recording of a symphony.

OBJECTIVES

Students will be able to imagine themselves in a movie. They will be able to express thoughts, feelings and behaviors as they become aware of them.

DESCRIPTION

Students listen to music and imagine a movie involving themselves.

ACTIVITIES

When the music begins, close your eyes and imagine that you are a character in a movie. Picture the screen: picture yourself on it. The music is the background music for the movie.

You are to create your own original movie with yourself in the leading role.

Picture yourself in some kind of situation, then let the movie roll on in your imagination.

Keep the movie in your imagination going for about 5 minutes.

After about 5 minutes, someone should turn off the music. Then open your eyes and read the questions below to yourself. Then let whoever wishes describe his fantasies.

1. What were the scenes you imagined yourself in?
2. Where were you in your imaginary movie? What kind of a place was it? Were you indoors? or outdoors? What country were you in?
3. Who besides yourself was in your movie? What were the relationships between you and the other people in your movie?
4. What did you do in your movie?
5. What was done to you in your movie?
6. What kind of movie did you make--comedy, drama, science fiction, or what?

7. Did your movie have an ending? If so, what was the ending? If it did not have an ending because time ran out, what kind of an ending do you think it would have had if there were more time?

8. In what ways was your movie like anybody else's? In what ways was your movie different from everybody else's?

9. In what ways does your fantasy reveal the real story of how you experience life? Do you experience life as a peaceful scene or as a battle? Do you see yourself essentially alone, or closely knit with others? Is your life a run-of-the-mill, routine drama or something quite unique?

VARIATIONS

Act out or write the movies envisioned.

SKILLS BEING DEVELOPED

Receiving, Responding, Valuing

CONTRIBUTED BY

Reprinted with permission from: Microcosm: A Radical Experiment in Re-education for Becoming a Person, St. Mary's College Press, Winona, Minnesota 55987. Author, Andrew Panzarella.

VALUES CLARIFICATION IN THE HUMANITIES

SUBJECT AREA

Art, Language Arts, Social Studies

OBJECTIVES

Students will be able to:

1. Trace some of the pervading social attitudes from 1876-1976.

2. Apply artistic models to their own creations.

DESCRIPTION

This is an excellent unit studying America's values and how they were expressed in art from 1876 to 1976.

ACTIVITIES

After an introductory session of defining terminology (including--humanities, symbols, myths, rituals, rites, anthropomorphic, values, sacred, profane, secular, religion, philosophy and hero.)

1. Classical definitions in art -- show filmstrip of Michelangelo, his life and works (with recording). Contrast this with visualizations of Henry Moore's sculptures. Contrast the Pieta with Moore's King and Queen with a discussion of line, mass, texture, color, intensity, focus, and composition. Question: What is a king? What is a madonna? Discussion on stereotypes of certain images.

2. Slide presentation of American art -- 18th century through super-realism. Question: How do you judge a work of art? Does the period in which the work was painted matter in terms of your judgement of that particular work? How does one determine the differences between elitism and popularist works of art? Is there a difference? What is commercialism in art? (See handout #1)

3. Presentation of prints of religious art works--showing in particular the contracts between 13th, 14th century paintings and 15th, 16th century paintings. Question--Why the flatness? What happened in terms of plasticity? Show a few Rembrandt's for further contrast and comment on the luminescent quality of his paintings. Question--What is religious art? Is there religious art in the 20th century? How does it manifest itself?

4. Presentation of varying self portraits. Question--What is realism? What is perception? How does one see? Example of magnolia blossom. (Have students examine a magnolia leaf in terms of line, color, texture, size, etc.) Initiated Discussion on observable reality. Definition of realism--objects as they appear to exist independent of

personal bias (prejudice) or any attempt to idealize. Reminder--all works of art are symbols. Question--What does the artist see? What does the viewer see of the art work? Establish the relationship between the two. Discussion of how artists are affected by their varying environments and what they have always "seen." Example--Henry Moore's fascination with the sea and sea shells.

5. Quick review of American painters--contrast with Impressionist movement in France and Mary Cassatt, Sargeant and Whistler--"foreign influences."

6. Further discussion of how one perceives reality--examples of El Greco's works. Also, how does colorblindness affect what is seen or any other eye "condition"?

7. Presentation of Picasso: The Early Years, The Later Years, (Filmstrips with records and teacher's guide). Discussion of Picasso's impact on western culture. For example--his use of African imagery plus geometric patterns dual perception. "Demoiselles L'Avignon," four female nudes - group picture - Negro facial characteristics, caucasion bodies -- profile and front view combined to create dual perception.

8. Project by student--U.S. architecture from 1876 on. Frank Lloyd Wright, the impact of structural steel and rising affluence. Wright's individual dwellings as well as community dwellings. Discussion of how space affects how you live. Contrasts of early Wright drawings with what is being built today.

9. Project by student--Ash Can school of realism followed by Hopper and Grant Wood as two examples of 30's realism in painting. Discussion of descriptive realism. Realism with interpretation, evocation of moods as well as social commentary.

10. Project by student--U.S. sculpture, 1920-1975, Jacob Epstein in particular--avant garde to traditional in a life time. Discussion of the advent of new materials and how these materials have affected sculpture--steel, plastics, etc.

11. Project by student--Andrew Wyeth vs. Norman Rockwell, Artist vs. Artist Illustrator--what are the differences? (Filmstrip on Wyeth available with record and guide). Discussion of realism again. Rockwell's creation of myths for the American public to believe is contrasted with Wyeth's depth perception and particularization of the individual or scene that he paints--Rockwell's symbols of people vs. Wyeth's "real" people.

12. Project by student--Abstract expressionism-Jackson Pollack. Why the break with "realism"? How did World War II affect the expressionists?

13. Project by student--Pop art and Op art, who, what, when, where? (Filmstrips available with records and guides). Definitions by Jasper Johns, discussion of Warhol's 20,000 cans of consumed Campbell's soup, the advent of Elvis, the film image of Elizabeth Taylor, the giant plastic hamburgers, cakes, hot dogs etc., of Oldenburg, assemblages, Segal's "people in plastic," etc. Why Lichtenstein's giant comic stips? What are these artists commenting on? And, are they laughing all the way to the bank?

14. Discussion of values--refer to handout #2. How are our values affected in terms of consumerism and built in deterioration, automation, excess leisure time, packaged food, mass communication, language changes, emergence of ethnic groups, monopolies, pollution, clothes vs. costume, religious and philosophical questions--"God is dead", minority movements--feminism, gay liberation, sexual packaging via mass communication etc., etc.

    How have all of the above, and more, been affected or affect the art of the times? Why and how have we evolved from descriptive realism, impressionism, abstract expressionism through Pop art, Op art and a quick glance at Art Nouveau and Super Real.

15. Filmstrip presentation of Super Real art--discussion of its impact and meaning.

The above presentations, discussions and projects presuppose adequate to good library facilities in terms of art books plus audio visual resource materials.

Handout #1

The following delineation of the differences between popular art and "elite" art is taken from: THE POPULAR ARTS IN AMERICA: A Reader, ed. by William M. Hammel (Harcourt Brace Jovanovich, 1972) from an essay entitled "The Popular Arts" by Russell Nye, p. 10.

"Elite art is produced by known artists within a consciously aesthetic context and by an accepted set of rules, its attainment (or failure) judged by reference to a normative body of recognized classics. The subjective element - that is, the presence of the creator or performer - is vital to its effectiveness. Elite art is exclusive, particular, individualistic; its aim is the discovery of new ways of recording and interpreting experience. Technical and thematic complexity is of much greater value in elite art than in folk or popular art; in fact, technique may become a vehicle for thematic expression, or may simply become an end in itself.

Popular art, aimed at the majority, is neither abstruse, complicated, or profound. To understand and appreciate it should require neither specialized, technical, nor porfessional knowledge. It is relatively free of corrective influences derived from minority sources; its standards of comprehension and achievement are received from consensus; it must be commonly approved, pervasive in the population, "popular" in the sense that the majority of people, like and endorse it and will not accept marked deviations from its standards and conventions. More individualized than folk art, but less so than elite art, popular art tends to be more dependent than either on the skill of the performer.

Popular art confirms the experience of the majority, in contrast to elite art, which tends to explore the new. For this reason, popular art has been an unusually sensitive and accurate reflector of the attitudes and concerns of the society for which it is produced. Because it is of lesser quality, aesthetically, than elite art, to an era's - and a society's - values and ideas. The popular artist corroborates (occasionally with great skill and intensity) values and a new experience than to validate an older one. Predictability is important to the effectiveness of popular art; the fulfillment of expectation, the pleasant shock of recognition of the known verification of an experience already familiar - as in the detective story, the Western, the popular song, the Edgar Guest poem."

Handout #2

Answer the following questions:

1. How do you look at or view a painting or any work of art?
2. What is the difference between visually observable reality in art and "abstract" art?
3. Why art? How do you define a "work of art" and is it (art) for everybody or a select few?
4. Is art public or private?
5. Is art a necessity or a luxury?
6. Does art inspire or inform?
7. Is art propaganda?
8. What is religious art?
9. Should an artist be completely "free" to express himself in whatever medium he chooses?
10. Should there be responsibility in art?
11. What do the terms color, line, mass, texture, composition and focus mean in judging works of art?
12. How do your values affect what you perceive? (Relate this to Question #1)

Choose ONE of the above for an essay topic--using your own experience write a one or two page essay. Prepare the other questions for discussion.

VARIATIONS

The above presentations, discussions and projects are not intended as an entity in and of themselves--it is hoped that all of these observations will lead to further reflections upon American values in contemporary society.

SKILLS BEING DEVELOPED

Synthesis, evaluation

CONTRIBUTED BY

Project Gateway, Title III, ESEA Grant, Lafayette County Schools, Oxford, Mississippi.

SUBJECT AREA

Art

OBJECTIVES

To encourage the flexibility of the productive thinker in the following ways:

1. To have easy access to subconscious as well as conscious levels of thinking.

2. To be proficient at a variety of mental operations and able to move freely from the operation to another.

3. To utilize several vehicles of thought, and readily transfer his thinking from one vehicle to another.

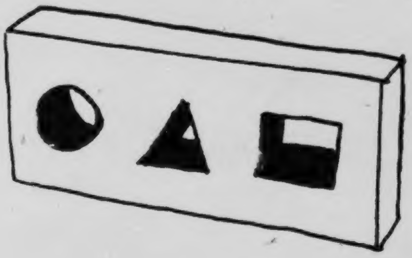
DESCRIPTION

Robert H. McKim in the publication Experiences in Visual Thinking pulls together several exercises to develop flexibility in thinking. He feels our minds should be trained to think in a variety of ways. Here are some ways to train "visual thinking."

ACTIVITIES

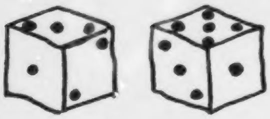
1. "Experience this interplay between perceptual, inner and graphic images for yourself as you solve this challenging and somewhat difficult puzzle."

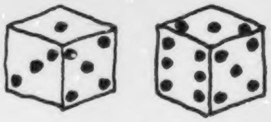
   The figure below shows a solid block that has been pierced with circular, triangular, and square holes. The circle's diameter, the triangle's altitude and base, and the square's sides all have the same dimension. The walls of the three holes are perpendicular to the flat front face of the block. Visualize a single, solid object that will pass all the way through each hole and en route, entirely block the passage of light.

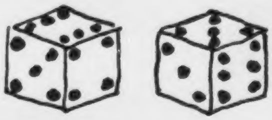


2. This problem works with rotating an object in space:

Examine each pair of dice below. If, insofar as the dots indicate, the first die of the pair can be turned into the position of the second one, place a check next to the pair.

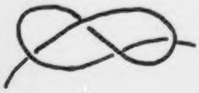




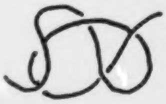


If you checked the second pair of dice, you correctly performed the operation of rotation.

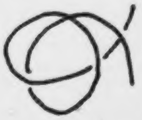
3. Which of the drawings of a piece of string below would form a knot if the ends were pulled tight?



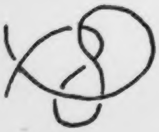
a



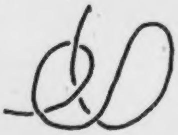
b



c



d



e

You correctly performed the required operation if you visualized the loops of string marked b, c, and e as knots.

4. "Da Vinci's Device" Create your own foil for projection. A quick way to obtain an amorphous pattern "useful in arousing the mind to various inventions" is to scribble lines on a piece of paper.

This exercise is similar to the well-known Rohrschack inkblot test. Da Vinci claimed it to be "extremely useful in arousing the mind to various inventions."

A. Close your eyes (so that you will not be tempted to influence the scribble) and cover a sheet of newsprint with a random network of lines. Use a light gray marker, such as a gray felt-tip pen.

B. Open your eyes and discover resemblances in the scribble. If you find that projected images do not come easily to you, seek specific meanings (faces, birds, animals). Once you've had this practice, open yourself up to whatever meaningful patterns come forth unbeckoned.

C. Reinforce and develop the meaningful patterns with a black nylon-tip marker or with color.

5. Changing Places. You will need the assistance of another person and the use of a prop, ideally a large square piece of white felt and five small shapes of colored felt (a yellow triangle, a blue circle, a black square, a purple cross, and a red diamond).

A. Randomly place one colored shape in each corner of the white square, and the remaining shape in the center. (Felt coheres, permitting this assembly to be fastened vertically so that a number of people can see it.)

B. Take one minute to commit your arrangement of colored shapes to memory. Then close your eyes.

C. The individual who is assisting this exercise should change the position of two shapes, announcing, for example: "I am switching the black square and blue circle." After a five-second pause to allow the others to make this manipulation mentally, another switch should be made and described verbally.

D. Without looking up, open your eyes and draw your mental image of the current arrangement of colored shapes. Then check your drawing with the actual arrangement.

E. If the exercise is too difficult, reduce the number of shapes to three and the number of switches to one, and increase difficulty gradually. With repeated practice, this mental operation becomes easier. When you master this exercise, you'll be able to track manipulations of the five-shape pattern indefinitely in your mind's eye.

Don't be surprised to find that mental manipulations of structure are difficult to make. The sculptor who physically changes the proportion of a clay figure performs work. The visual thinker who does the same operation mentally also performs work. The husband who physically moves the living room furniture around until his wife is satisfied with a new arrangement uses his muscles. Similarly, moving component parts in your mind's eye requires "imaginative muscles"; indeed, you may actually experience experience sensations in your muscles (kinesthetic imagery) while mentally manipulating structure. Whether performed physically or mentally, moving things around requires active effort. It is always easier to leave things as they are.

SKILLS BEING DEVELOPED

Flexibility, elaboration, complexity. Imagination through visualization skill (Frank Williams' Model for Implementing Cognitive-Affective Behaviors in the Classroom).

CONTRIBUTED BY

Reprinted from Experiences in Visual Thinking, Robert H. McKim with permission of Brooks/Cole Publishing Company, Monterey, California 93940.

MAKE A MELODY

SUBJECT AREA

All

MATERIALS

Popsicle sticks.

OBJECTIVES

Students will be able to understand how shape, line, form, tone work together to balance in a work of art.

DESCRIPTION

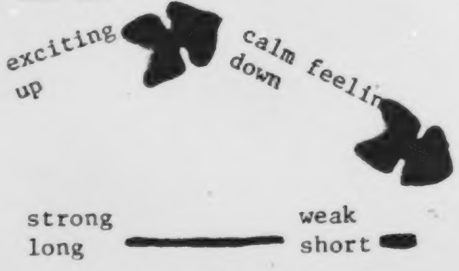
This activity can be used in any subject to illustrate the importance of balance.

ACTIVITIES

1. Decide together what words you want to sing. SAY the words out loud together.
2. Some syllables are stronger than others. As you say the words again, clap on the strong syllables. Now clap on every syllable. How can you clap differently to make the stronger syllables sound different?
3. Now sing the words on a one pitch-chart. Are there some pitches you would rather sing higher? Make changes of high and low wherever you like.
4. Would you like to change any rhythms? When you have your melody as you like it sing it several times so you will remember it.
5. Starting with one popsicle stick, can you use other sticks to create a small sculpture; can you make it so it moves? Relate your machine to your melody in terms of the following elements-shape, form, balance, line, space.

Some things a melody can do:

Make the notes go:



Put your notes together using: skips or steps on the same tone. Start and end on the same tone. This becomes a "keytone." This makes the melody balance. Choose several tones on an instrument and experiment.

Where is balance necessary in government?
What part does balance play in nutrition?
When is balance a factor in math?

SKILLS BEING DEVELOPED

Application, synthesis, evaluation.

CONTRIBUTED BY

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THOU ART

SUBJECT AREA

Art, Social Studies, Language Arts

OBJECTIVES

Students will be able to understand that intuition, imagination and selection are key ingredients of all creative endeavors.

DESCRIPTION

Encourage art activities which enhance other concepts or content through activities such as the following.

ACTIVITIES

1. Using just one word or a nonsense syllable, endow it visually with the qualities of feeling it originally engendered. Tapes of sounds and words may be prepared beforehand for students' reactions and responses. You may also animate words.

2. Develop a sequence of pictures that change through gradual or subtle differences the original intent--i.e. a tree into a rifle, a cart into a horse.

3. Study natural objects for qualities of other things or beings--photograph silhouetted trees, shrubs, poles, sign posts that remind you of personalities, human qualities or characteristics.

4. Choose a contemporary social or political problem and create a poster or collage incorporating calligraphic qualities, visual impact and message.

5. Uniqueness of expression within a culture can be shown through a comparison of art done by various individuals within a culture. For example:

   Germany
   - Durer, 1471-1528
   - Holbein, the younger, 1498-1543

   Florence
   - Botticelli, 1444-1510
   - Leonardo, 1452-1519
   - Michelangelo, 1475-1564
   - Ghirlandaio, 1449-1494

   How do you identify the work of individual artists?

6. Demonstrate how a rigid cultural form of expression can stifle the individuality of the artist. For example, the Egyptian

Dynasties' standards or rules of representation, Byzantian stylizing of religious subjects. You will probably discern that even so, artists still managed to express their individuality. What influence do philosophy, attitudes and values of the general culture have upon the artists?

7. Investigate the individuality of "folk artists" through interviews with local quiltmakers, fiddlers, wood carvers, stitchers and weavers. You may want to video-tape these interviews, record them photographically, prepare a publication.

8. Through a comparative study of the art of various cultures, develop the idea of uniqueness in the form of the artistic expression within a culture. Some examples for comparison:
    Egyptian art of the Dynasties
    Byzantium
    Gothic
    Renaissance in Italy
    African
    Oriental

   Explore possible reasons for the means and form developed: the historical time period, the political, social, religious, environmental, technological and geographical implications; the values, understandings and emotional tenor of the culture. Discuss religious iconography and the restrictions of governmental control of the art form.

9. Create an environment in a classroom, backstage or any available area. Choose a culture or a country being studied in social science. Research it.
    A. Create visuals...slides, overhead transparencies, murals, sculptures, masks, headgear, textiles, representations of people, animals and plant life.
    B. Gather or develop appropriate sounds; music, tapes of bird or animal sounds, chants, voices, etc.
    C. Prepare foods of the area, relating diet to the human condition.
    D. Experiment with dances, rituals, drama using headgear, masks and costumes. Try lighting effects and multiple projection.

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation, receiving, responding, valuing, organizing, characterizing.

CONTRIBUTED BY

Reprinted with permission of Joe McCarthy, from Arts Packet available from Pennsylvania Department of Education, Box 911, Harrisburg, Pennsylvania 17126.

THE TEXTURE WALK

SUBJECT AREA

Art, Science, All

MATERIALS

Set of crayons, charcoal, or pastels for each group; sheets of paper; list of types of textures to be collected; map of area (if necessary); evaluation sheets and pencils; tape or tacks for displaying textures.

OBJECTIVES

Teaching:

1. To provide an experiential facet in meeting the overall course objectives of exploring the relationship of art and life or art and personal experience.
2. To broaden the overall objective of giving students opportunities to practice with various media by providing an opportunity for group effort.
3. To combine physical, social, and artistic learning in one class experience.
4. To provide an experience in exploring textures which will lead into actual application of learning.
5. To give students responsibility for planning, completing, and organizing.
6. To enable students to become aware of group processes.
7. To use the environment and the world outside the classroom as a "course of study."
8. To operate in a time span larger than the ordinary period.

Learning:

1. To become aware of the variety and expressive possibilities of textures in the every day world.
2. To learn techniques for collecting different textures.
3. To learn to cooperate, plan, and carry out a group project.
4. To experience feelings of competence, confidence, accomplishment with successful completion or realistic assessment in cases of incompletion.
5. To apply the elements of composition to an actual creation of the group.
6. To apply critical principles to the artistic creations of others.

ACTIVITIES

Definition of Expectations:

Clear definition of expectations is a crucial element in the successful implementation. The students need to know that they are expected to take responsibility for:

1. Completing the project within a definite time interval.
2. Working and staying together as a group on the project and looking out for each other on the walk.
3. Checking in at each of the sites.
4. Preparing a final display and evaluating each other's work.
5. Knowing that their work will be evaluated for aesthetic qualities as well as for originality and completeness.

The atmosphere in the situation should be defined as supportive and cooperative rather than competitive.

Rules concerning smoking and hitch hiking and the time for return need to be clearly spelled out.

Evaluation:

Evaluation may be a threefold process involving both students and teacher. The first part is the student evaluation of each other's work in terms of color, line, design, composition, and originality. We used the evaluation sheet on the following page for this purpose.

The second phase involves asking each group to look at the processes involved: Who made decisions concerning textures and composition? How much did the group accomplish? What slowed the group down? Who did the actual work? Who had the ideas? Who talked? Who was silent? Why? What could the group have done differently? Did anyone take over leadership? Was this good or bad? Did everyone understand? Did everyone have a chance to try getting a texture? What was the atmosphere in the group during the morning? This can be done by sitting down informally and discussing the experience.

The teacher's evaluation of each group's work will be based on aesthetic qualities, originality, and completeness in collecting the textures on the list. Beyond this, it will be useful to look at ways to improve the experience for students, to observe ways in which increased awareness of texture is demonstrated in work in other media, and to note the degree of proficiency in gathering textures.

The real strength of the experience and test of learning comes, however, in the variety and effective use of texture in the lessons which follow. Having spent time collecting textures, students generally demonstrate vivid awareness of the expressive and dynamic potentials of texture in a variety of media.

Handout: A TEXTURE WALK

Your group is responsible for: 1) getting to each of the three sites within the set time schedule. 2) Collecting each of the following textures. 3) Putting them together on one sheet to be put on display. 4) Checking in at each of the three sites. 5) Evaluating the work done by other groups.

1. A blue texture
2. A texture you walk on
3. A texture unique to the school
4. A texture unique to the graveyard
5. A living texture
6. A texture that expresses a sound in nature
7. A happy texture
8. A sad texture
9. a quiet, peaceful texture
10. A texture important to a horse
11. A scientific texture
12. A cold texture
13. A dead texture
14. A loving texture
15. A hateful texture
16. A texture expressing how you feel
17. A porous texture
18. A man-made texture
19. A textile texture
20. A very new texture
21. A very old texture
22. A dull texture
23. A texture you can't get on paper and get it on paper
24. A texture from the gym
25. An early spring texture
26. A cowardly texture
27. A jealous texture
28. An automotive texture

Handout: EVALUATION SHEET FOR TEXTURE WALK PROJECTS

Rate the project on a scale of 1-10. (Ten is the highest)

Does the project have:

1. Good balance
2. A variety of shapes and lines
3. Effective color
4. Strong placement
5. Coherent unity
6. Balanced use of mass and detail
7. Center of interest
8. Effectively controlled motion and thrust

Does the project make a strong statement?
Name at least one way the project could be improved upon.

VARIATIONS

The idea lends itself to application in a wide variety of media in art and photography, sound, poetry, or to a science course, i.e. going out to collect soil samples, plants, opinion polls, etc. And it can be effectively combined with outdoor activities or picnic lunches.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application, synthesis, evaluation, receiving, responding, valuing, organizing, characterizing.

CONTRIBUTED BY

Project Adventure, a Title III Project, Hamilton-Wenham Regional High School, 775 Bay Road, Hamilton, Maine 01936.

DANCE EXERCISES

SUBJECT AREA

Drama, All

OBJECTIVES

Students will be able to explore movement and self-expression through the following exercises.

DESCRIPTION

One aspect of individual development that is commonly neglected is movement. Movement exercises can help in so many ways: they break down inhibitions for any type of creative expression, they enhance overall physical coordination, posture and poise, as well as condition the body. Use them in any class for boundary breakers!

ACTIVITIES

1. Initial sense of body control:

   - Preliminary exercises in alignment and breathing, centering the weight, lifting it up through the floor and freeing the arms, shoulders and neck.
   - Simple stretches of spine, hips, legs, and feet with emphasis on the fixed point from which the stretch takes place and the stabilizing of other actions while the breathing stretch takes place.
   - Isolations of movements of particular body parts such as shoulder forward-center-back-center and up-down, both shoulders together, separately and alternating. Emphasis on clear direct action of only that part moving.
   - Simple movement tasks which must be understood exactly in their principles but not dependent on any particular body shape or placement; i.e. a steady deceleration which could be done with one body part..., walking, spinning or rising so long as the deceleration is evenly controlled.
   - Simple combinations of movement in place or across the floor which are exactly understood in their timing, energy use, and body placement. When you develop the movement phrase, you should decide the quality and imagery which should be captured in the performance.

2. Greater awareness of body control:

   - Locate the center of the body (behind the navel). Stretch away from and relax into that center. Shift from standing to kneeling to sitting to lying down and up again keeping a breath rhythm as a basis for timing.

Move the center forward, side, back, and around in various places and directions. Think of this center as a button on a string being held vertically and spun so that it bows out and around.

Imagine that your whole body is in cement up to the middle. Your upper body is free to sway forward, side, and back from the center, somewhat like a flexible tree with strong firm roots in the ground.

- Locate centers at your shoulders and hips. Imagine that those centers are fixed like the ropes of a swing to a branch of a tree. The branch goes into the side of your shoulder or hip and your arms or legs swing freely as the ropes...alone, in combination, to different heights, and even around.

- Locate a center point outside the body as on a branch above. Imagine your center of weight is attached by a rope to that center and begin to swing your whole body unit in relation to that fixed point above. You will be lowest when directly below the point and highest when fartherest forward or back.

  Locate a center beside you. Touch it with your fingers keeping your arm straight and walk around it. Move further out from that center and travel the circumference again, but in addition think of the center inside your body and raise it up and lower it so that the circling becomes like horses on a merry-go-round.
- Work in couples or small groups taking turns pointing to or making yourself become the projection of different axes for the others who try to move according to the axes given.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation, imitation, manipulation, precision, articulation, naturalization.

CONTRIBUTED BY

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DANCE CREATIVITY

SUBJECT AREA

Dance, Drama

OBJECTIVES

Students will be able to develop self-expression through dance.

DESCRIPTION

Dance is an excellent form of exercise as well as self-expression--here are some ideas which would enhance drama or PE classes as well as dance classes.

ACTIVITIES

1. Concentrate on feeling, seeing, and hearing the motion provided in a series of short sequences. Spend enough time so that you become very sensitive kinesthetically to the movement idea and will be able to use it as vocabulary for a personal sequence.

   Sample sequences:

   Press out air, contracting the body inward and toward the center. Then inhale deeply as the body expands outward.

   Turn slowly placing each foot clearly on the floor. Gradually accelerate to a sudden, clear, and audible stop.

   Walk very smoothly in a path around the room to the sound and duration of a vowel sound.

   Use quick strong gestures of the arms and legs exploding air in consonant sounds as in Karate.

   Sequence, phrase, and dramatize the actions in any combination or repetition, making sure you are aware of the sensory experience created for others as well as for yourself. After you have shown your work, discuss the sources of your decision making in constructing your sequence. It is likely that some examples of aesthetic reasoning based on perceived rightness will emerge. (It looked better. It felt right. It seems to sound better this way.)

2. With a group of 8 to 12 classmates, create motion sketches around environmental images; i.e. a large body of water, variable wind, a sail boat. One person becomes the sound maker who controls the wind factor while most of the dancers create the overall rippling or waving of a changing sea. Several dancers can move through the space, gliding and accelerating and changing direction. A range of images can be imagined to include vertical movement as well as horizontal, explosive as well as sustained.

3. Establish a pulse or basic beat in one part of the body (head) and then shift it through other body parts (shoulders, hips, knees, arms) until finally it becomes a walk. Alternate tempo (fast,

medium, and slow). Experiment with accents, acceleration, deceleration. Try acceleration/deceleration going from up to down, down to up, forward or back, with total body or just body parts.

4. Think of series of activities or energies that go in sequence in the environment, in mechanical or electrical operations; i.e. (amusement park sledge hammer event in which the person 1. gets set, 2. swings the hammer, 3. hits lever, 4. the weight goes up, 5. maybe strikes the bell, 6. comes down again, 7. reverberates) Try to recreate the quality of time and energy used through the sequence. You may first mime the sequence, but then you should try to take any common elements of shape, situation, or space away and just recapture the time-energy series. This can also be done with human feeling episodes involving the shifting energies and times of developing excitement, fear, etc.

5. Capture and convey movement and sound qualities by sitting in circles of approximately 8 people. One member begins by performing a very simple 2 or 3 phase movement with sound (example: relaxing forward, sounding sssssshhhhhh; twisting and looking to the side, sounding uh.) Each member in sequence around the circle repeats exactly the pattern. When the last member has completed the pattern, he or she adds another segment. This enlarged pattern is then sent around the circle until one long pattern is developed.

6. Devise improvisations or short dances starting from different initial sources:

   Plastic clothes bags, hoola hoops, or any provocative materials or implements. Experiment with shape, texture, sound, real and imagined functions, uses as signals, boundary markers, vehicles for dramatic intereaction, or sources for timing.

   Elevations and falls or any other skills or heightened kinesthetic experiences. Experiment with movement sequencing, varying energy and rhythm, clear and unclear eye focus, individual or group dependence.

   A Haiku poem, a mobile, or any other sensitive source of imagery; verbal, visual, or auditory. Experiment with weight, color, taste, tone, rhythm, viscosity, clarity, character, surprise, resolution.

7. Respond spontaneously to previously prepared initiating sources:

   Prepare a series of cards containing a series of things to do. These should call for spontaneous or imaginative responses. The activities may include abstract sound or visual cues, household chores, singing, reciting...As one person signals, the rest of the group must quickly read the card and within a few seconds produce a movement appropriately selected for its responsiveness to the written description.

Prepare a series of "feeling bags" each containing a material of different texture. As a person feels the texture, his or her movement should reflect the feel of the texture itself, its opposite or the person's response to the texture.

Say a word, make a sound, project a visual image so that others may move in spontaneous response OR study the image, listen to the sound and allow ideas to grow imaginatively. Select the ideas you feel are most satisfactory and develop movement patterns that express your ideas and feelings.

In each of these instances, an imaginative choreographer could plan the responses into a sequence, creating an expressive, sensitive dance.

8. Develop a series of at least 10 movements (vocabularies). Agree upon a quality or overall attitude for the performances; i.e., cool, refined, militant, boistrous, serene, agitated. In small groups quickly arrange short dances using the vocabulary so that it is recognizable to everyone in the group. How long do you think it would take before the group would diverge into unique styles and vocabularies if they were to continue to dance together?

9. Systems for reading and writing movement allow dances to be notated and then reconstructed at a later time. Study the ways that have been devised:
   - Basic symbols of motif writing--Prepare overhead transparencies containing the symbols. Devise a game that will involve your friends or younger students in simple movement phrases if they interpret the symbols correctly.
   - The basic staff and symbols of Labanotation--Read and write simple walking patterns with changes in level, direction and rhythm. Exchange scores so that each may read and perform the patterns of another.
   - Flash large symbols on the wall as a basis for improvisation.
   - Stage directions--Give directions to each other. (Go downstage, left and face upstage, right.)
   - Recall movement vocabulary you already know--Compare the movement with symbols. How would you record the tempo, feeling of the various dancers? Compare music terminology such as allegro, andante, staccato, with the desired movement.

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation, imitation, manipulation, precision, articulation, naturalization.

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SOCIAL DANCE ACTIVITIES

SUBJECT AREA

Dance, Social Studies

OBJECTIVES

Students will be able to explore dance as an art form which has social and artistic importance as well as provides a medium of self-expression.

DESCRIPTION

The Pennsylvania Department of Education has put together a program of aesthetic education which seeks to integrate all of the arts and combine them with different subject areas. Here are some dance ideas from their Arts Packet. Many can be used in social studies to point up the cultural and societal heritage of different periods.

ACTIVITIES

1. Imagine that your school is a total society or tribe. Outline the times, places, and ways you might dance. What kind of dance might you do in the morning, noon, or after school? Would there be leaders? Would there be couples, small groups, or one large group? How would the teachers relate? Would their dancing be cool or energetic? Would it change with the circumstances? Would there be any point at which the purpose of the dance was more than social but political or spiritual?

2. Select folk or ethnic dances with different clusters of qualities and themes. A range can be found within one cultural region, but it is easier to get obvious contrast by selecting from different cultural areas. Example; Slavic, English Country dance, Greek, Mexican. Perform the dances and try to experience their qualities rather than projecting a preferred American feeling on them. (e.g., castanets and heel tapping are inherent in all Mexican dances?) Later define some of the feelings, preferences, and understandings that the dances seem to suggest.

3. Perform selected dances from different societies or periods of time. (Court Dance, Square Dance, Charleston, Hula, Kolo, Highland Fling). Discuss some of the clues which enable differentiation among dances and some of the factors which might be relevant to their particular character. You may delve into the music which was usually featured with these various dances and possibly the environments.

4. Arrange for a folk festival that is representative of the ethnic or cultural groups living in your geographic region; OR attend a folk festival where the dance, music, costume and foods of various groups are featured; OR interview people from other

countries, video tape demonstrations or exhibits of their arts.

5. Set up lights as in a shadow play. Observe your classmates as they dance in the lights. Guess the identity of the dancers. Discuss peoples' moving "fingerprints" and the sources of individuality. Question whether they might be able to make distinctions between people from different cultures or eras by their movements. Discuss the dangers and uses of stereotypes and the need for particular knowledge in making assessments as in your own identification of each other. View films featuring the founders of particular styles or innovations in dance. It is frequently easier to observe the differences if you don't use the sound tracks. How do their movements differ from one another? How do their movements reflect the time and place in which they lived? Select sound accompaniments for the featured artists. Compare your choices with the sound tracks of the films.

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation, imitation, manipulation, precision, articulation, naturalization.

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SPACE DESIGN

SUBJECT AREA

Dance, Drama, Music

MATERIALS

Piano Music: "Ganztaonleiter - Melodie"
"Zweitonales Stuckchen"
"Nordifdhes Lied"

OBJECTIVES

Students will be able to increase their movement repertoire by experiencing the space design study.

DESCRIPTION

If melody in music is defined as relating to the profile, the outer shape, with no thought of an inner physical quality, in dance it has to do with movement delineations in space--the contour, the outline--and not with any inner muscular-physical quality.

The dancer is advised to explore the space about him for new and strange designs in both pose and action; for new delineations of movement in space.

Strange space design is achieved in the body for forswearing the symmetric in gesture or in posture; one shoulder higher than the other, hands at different angles, knees focused in different directions, a feeling deep throughout the whole body of distortion and strangeness. There should be no natural walks or leaps, no predictable sequence.

A second recommended dance study in Strange Space Design is an experiment with movement which consciously measures out planes in space. Each part of the body is aware every moment of where it is in respect to the audience. There is no quality or idea contained here, no emotion involved. This is just a muscular experiment.

Quote from a dance study in Strange Space Design: "I know it hurts. You didn't think it was going to be fun, did you? Dance and be happy."

ACTIVITIES

Explain that we are going to begin our unit with a study of Space Design.

Write the words: Creative Movements and Space Design on the chalkboard.

Begin the teacher explanation of Space Design by making a comparison with Space Design and Abstract Art.

A. Ask the students what abstract art is. Sight some examples of abstract art to give those who seem not to know a clear picture.
B. Explain to the students that an artist who paints abstract pictures must use a paint brush to paint his desired designs.
C. Explain to the students that like an artist, we are going to use our bodies to make our design. Instead of a paint brush to create--we are going to use our body.
D. Explain Space Design further by using these descriptive adjectives: Space Design is: ugly, unusual, uncomfortable, different

Have several students who have had instruction in space design demonstrate for the class.

Instruct the students to select a spot in the room (sitting, standing, or lying on the floor--or any other desired position.)

Instruct the students to try to create a space design. Play the music, Dance Macabre.

Get comfortable position on floor.
Close your eyes.
You are to be an insect.
Think and concentrate on your insect.
 a. Where does your insect live?
 b. What does your insect look like?
 c. What color is your insect?
 d. How does your insect move?

Music played:

What is an appliance? Discuss appliances. Be an appliance. Volunteers selected to be an appliance. Let class guess what kind of appliances.

Get comfortable to listen to some music.

Think of whatever comes to your mind. I will play the music again and you pretend that you are an animal. Move anyway you want and be your animal. Pick out five really unusual animals. Class take their seats and try to guess what these are. Use facial expression.

Pick out some music.

Have students pretend they are these various things: individually, couples and in threes. 1) animals (during lifetime) 2) death 3) appliance 4) piece of wearing apparrel 5) furniture 6) babies 7) flowers.

Experiment with having people lie on their backs or stomachs and move only their head and extremeties.

In each of the above activities, accompaniments can be to draw a picture or write a story of the thing they are imitating or creating.

Music - The Swan

How many have ever seen a movie or read a book that made you cry? This is called sorrow. Can you think of something that makes you sad? Ask the class for their responses.

Find a comfortable position on the floor. Try to relax completely. Get everything out of your mind. Think about the saddest thing you can think of. Let's see how much emotion you can show by just lying quietly and concentrating.

Select record at home and plan to do some movements to it. Give the students several days to plan this activity.

*Play records. Have students lay their heads on the desks and concentrate on the music being played. Discuss the music.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application, synthesis, evaluation, imitation, manipulation, precision, articulation, naturalization.

CONTRIBUTED BY

Diane Dudley, "Creative Opportunities," Nebraska Department of Education.

SUBJECT AREA

Creative Drama

MATERIALS

An open space.

OBJECTIVES

To pantomime.

ACTIVITIES

I. "Who started the motion" concentration game; everyone in circle.

II. Small pantomime.

   A. Eat a piece of fruit; remember how to pick it up, how to handle it; remember how it feels (its weight and texture); remember how to eat it; how to chew it.

   B. Discussion: What piece of fruit is it? How do you know what piece of fruit it is? Did the manner of picking up the piece of fruit tell you?

   C. Select any object (imaginary) and use it; play with it.

   D. Discussion: (similar to fruit discussion).

III. Tug of war; try to give an imaginary rope reality. (class in groups of five).

   A. Divide into four groups of five. Two groups tug against each other. Two groups watch. Watching is important. Watchers have to observe carefully in order to see what is being done, how the participants work, how the participants handle the rope and if it is believable. If not, what could be done to make the handling of the rope real?

   B. Participants: Imagine/remember what rope feels like. Imagine/remember the weight and thickness of rope and texture. When you are ready, start pulling the rope.

   C. Watchers: Did you believe that this was a real rug of war? Why? Why not? What was not real? What could be done to make it real? Was everyone pulling together? Was there a give and take?

IV. Chopping a tree with an ax; try to give the tree and ax reality. (Class in groups of two).

A. Watchers have to carefully observe and tell what you see.

B. Participants: Imagine the tree, the size of the tree, weight, and texture. Imagine/remember how to handle an ax, how an ax feels. Is it light or heavy? What is the texture? Imagine/remember how to swing an ax. Imagine/remember how much force you use to handle an ax.

C. Watchers: Did you believe that these people were chopping down a tree? Why? Why not? What was not real? What could be done to make it real? Why is it important to remember the size and weight of the tree? Does the size and weight affect how long it takes to chop down the tree, how difficult it is to chop down the tree? Is it important to imagine/remember the size and weight, texture of an ax? Why? Did you feel that these two people were working together? Why? Why not? How could these people work together? We have to imagine, remember and concentrate as well as work together to make the activity of chopping down a tree real.

V. Large pantomime (everyone in their own space)

A. I'll give you a series of daily activities and I want you to imagine and remember how you do them and then do them. If you use an object, remember what we talked about. Imagine the object; remember what it feels like: the weight, texture. Remember how to handle it, how to use it. In order to do these activities you have to imagine, remember and concentrate.

B. Everyone in their own space, lay on the floor. You are asleep in your bed. The alarm goes off or your parents wake you up. Put on your clothes. Go to the bathroom and wash your hands and face, brush your teeth, and comb your hair. Go to the kitchen. Eat breakfast and wash the dishes. Go to your room to collect your books. Put on your jacket and go out the door to school.

C. Discussion: Was it difficult or easy to do these activities? Why? Why not? What objects did you have to imagine? What activities did you have to do?

D. Everyone in their own space, remember/imagine. Come home from school, take your books to your room, change clothes, go outside and play. Come inside to do your homework. Set the table for dinner, eat dinner, clear table, and wash the dishes. Do the rest of your homework. Change clothes to your pajamas, go to bed, go to sleep.

E. Discussion: What objects did you have to remember/imagine? What activities did you have to do?

SKILLS BEING DEVELOPED

Imitation, manipulation, precision, articulation.

CONTRIBUTED BY

Charlotte Morris

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May be obtained from Mr. Gary L. Kroeger, Director of Fine Arts, Lawrence Unified Schools, 2017 Louisiana Street, Lawrence, Kansas 66044.

AIRPORT

SUBJECT AREA

Drama, All

MATERIALS

Chairs

OBJECTIVES

To provide a constant focus, the physical and the aesthetic demands of the stage, for future reading and discussion.

To introduce theatre and theatre practice.

To begin to explore how the stage affects the actor and the audience.

To provide discussion time for Period One's actors and audience to see how each was affected in the process as well as the effects of restaging in different forms.

DESCRIPTION

The game of "Airport" involves several interpersonal skills, allows for student creativity while pointing out some very basic dynamics in communication and emotions. While this is particularly directed to play production, it could be used in any subject to demonstrate the needs of clear communication and human interdependency.

ACTIVITIES

A landing strip is made by placing two lines of chairs back to back about four feet apart. A good length for the runway is twelve feet. The space between the chairs is then strewn with obstacles (in such a way that they could be avoided if care is exercised): books, shoes, etc. One student is blindfolded: he is the pilot who is trying to land his plane on a foggy night on a runway which is covered with wrecks, potholes, etc. His radio transmitter is dead. He can hear the control tower, but he cannot speak. Another student becomes the control tower and chooses one location from which to give directions during the landing. The pilot is placed at the end of the runway; his object is to get through the twelve feet of littered runway without touching any of the objects along the way. Any touch (including the chairs) is a crash, and a new pilot and control tower try their hand at it. Each student should get a chance at both flying and controlling, although time may be a problem. (You might try setting up two runways at different ends of the room.) You will find that the students begin to develop all kinds of theories about how to direct one another, how to slide, inch along, move their feet, judge distances, etc.

When everyone has given the game a try, ask the class what Airport and theatre have in common. The areas that may come up are given circumstances and the suspension of disbelief, two actors, an audience, lights and set. Afterwards you can go into empathy and the basic tools for dealing with a script: objective, obstacle, action. You might finish this particular discussion by examining different ways in which success at Airport was achieved. What made a good pilot? What made a good control tower? It is also worthwhile to consider the actor-director relationship.

SKILLS BEING DEVELOPED

Application, synthesis.

CONTRIBUTED BY

Reprinted with permission from "Theatre's Different Demands - An Approach to the Teaching of Plays" by Mary Hunter Wolf and Victor B. Miller, Center for Theater Techniques in Education, 1850 Elm Street, Stratford, Connecticut 06497.

SOUND EXPLORATION

SUBJECT AREA

Music, All

OBJECTIVES

Students will be able to explore different aspects of sound.

DESCRIPTION

Develop students' awareness of sound and how it relates to emotions and societal conditions through the following activities.

ACTIVITIES

1. Simulate a political, social or emotional situation (i.e., a political rally, a football game, a lost pet) supply and arrange appropriate sounds (words, music, syllables). Various members may direct the group, working toward a definite mood, feeling of excitement or whatever emotion has been identified with the situation. As an extension of this, several emotions may be combined, the appropriate sounds being supplied and arranged to convey these emotions.

2. Listen to and/or record environmental sounds, i.e.
   wind through trees in leaf, without leaves, dry grass,
   through a narrow opening in window, around flapping
   clothes, awnings, window-blinds
   motor sounds, horns or whistles in the distance, close by
   water tumbling over stones, into a jug, a flat pan, trickling
   into a cup, a basin, etc.
   Compare and contrast for mood produced. Use instruments to approximate the environmental sounds. Compile and/or compose a sequence of environmental sounds that engender particular moods.

3. Observe machines in operation (at a construction site, in an industrial plant). Record the sounds. Using broad, quick strokes of a felt-tip marker note directional movements of machinery parts. Listen to your recording, noting the rhythmic patterns, tone quality, dynamic level and pace. (tempo). Compare with the gesture drawings. Develop a movement sequence that exemplifies the machines. Compare people moving to machinery moving to your drawings. Compare your observations with musical compositions of Verese, Cage, Honegger, Stravinsky or others. How does each person reflect upon the era of the machine? What would you say the composers' ideas and feelings are? Are there other contemporary composers writing from other feelings, other ideas? What qualities in their music express that feeling or idea?

4. Select several unfamiliar contemporary musical recordings. Don't worry about learning the titles. Listen to the music. Then note

the title and any comments the composer may have made about the music; where the idea came from, what feeling was being expressed. Compare the composer's ideas with your own as you heard the music. All composers have worked out of historical, philosophical or societal circumstances. Listen to recordings of music from other times and places, noting the influence those circumstances had upon the compositions.

5. Select and research a particular historical era of a particular people. Develop a multi-sensory environment that includes music, environmental sounds, spoken language, sights and textures, geographic features, foods, costume, fibers, decorative design. (You may want to correlate your work with your studies in world cultures OR you may want to develop the environment for other groups of students.) If your class divides into groups of three or four students with each group preparing an environment in an appliance packing case, you will have a number of cultures represented and will be able to make immediate comparisons.

6. Prepare a collage (an audiotape) of the sounds of various cultures as exemplified in their folk music:
   Japanese and/or Chinese
   Indian
   African
   Spanish
   Arabic
   American Indian
   Slavic...

   Compare by moving as you feel the music. (Much of the folk music is an expression of celebration or ritual and therefore dancing and singing are natural complements.) Do you feel the differences in rhythm, tone quality, dynamics, tempo...? Search out the original words to some of the melodies and compare their "fitness" with the English translations. If possible, listen to and learn the original words from someone who speaks the language. Attend a folk festival or a performance by a group such as the "Tambouritzans." Explore the feel and sounds of folk instruments. Play a zither, dulcimer, mandolin, flute, etc. You may want to investigate any or all of the following questions:

   Has every culture made music on string instruments? wind? percussion? How do they make the instruments? What shape, what decoration? what materials are used? What kinds of sounds do these instruments make?

7. Go on a 'hear and feel' hunt. Listen to the sounds made by striking, plucking and blowing objects in the environment until you find sounds that are 1. the softest, most soothing, most mellow sound you ever heard, 2. the clearest, most ethereal, most soaring, and 3. the harshest, most vibrant, most shattering sound you ever heard. (You may want to set up other descriptive categories.) Find a texture that 'suits' each sound. Try matching the sounds on musical instruments, with your voice, with classroom instruments. Try producing these sounds in different

registers--higher or lower. How does this change affect the sounds? How does it affect you? Organize three sounds in a way that expresses your inner feelings about them. Use either the environmental or instrumental sound, or combinations of both.

8. Play matching pitch games:
   - One person establishes the starting pitch and interval. Others individually match the pitch and interval by singing their names, nonsense syllables, names objects. If a category has been established, anyone who sings the name of something outside the category must change the pitch pattern and others who follow use the new pitch pattern. Notate the intervals and scales, becoming familiar with seconds, thirds, etc. You may make the game more complex by developing it in the manner of Toch's "Geographical Fugue."

   - Complete a melodic phrase by singing an appropriate pitch. Note the different effects achieved by differing scale tones or cadences.

9. Select a comic strip and compose a short opera, suite or symphony in which each section captures the mood and spirit of each picture in the strip. You may notate your music so that others may produce it accurately. If you choose the operatic form you will want to consider the development of the libretto as well.

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation.

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PATCHWORK MUSIC

SUBJECT AREA

Music

MATERIALS

Tape recorder and tapes.

OBJECTIVES

Students will be able to:

1. Identify different types of music heard in America.
2. Put together their own tape combining the different types of music.

DESCRIPTION

Need an idea for a classroom project to pick things up a bit? Here's one.

ACTIVITIES

1. Because Americans have come from around the world, our music is international. Africa sent us the seeds of jazz; Italy, opera; Germany, the symphony. And the flow continues. Within the past few years, "regae," a new kind of rock, has arrived from Jamaica.

   Unfortunately, most Americans know only a small part of this rich patchwork of musical sounds. To hear more, make a tape recording that contains bits and pieces of music from our world heritage, and also musical styles that have grown up here. You might make your recordings from different radio stations. (Some stations specialize in music from different cultures.) Or borrow a variety of records from your friends, and from the library's record collection.

2. Play the tape in class, having students identify and list the qualities of the different types.
3. Divide class into groups and have them make their own such tape, organizing it in any way they would like. Some may come up with themes (love songs, happy songs), others may put together a musical history of America.

VARIATIONS

If any of the tapes are promising enough, perhaps a skit could be built around it.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application, synthesis, evaluation.

CONTRIBUTED BY

Idea taken from "Happy Birthday to U.S." publication by TAG; Murry and Roberta Suid, Addison-Wesley Publishing Company.

MUSICAL PROBLEM-SOLVING

SUBJECT AREA

Music

MATERIALS

Described in activities.

OBJECTIVES

Included in description.

DESCRIPTION

Below are some ideas for activities in musical listening. They are taken from an article in The Journal of Creative Behavior by Saul Feinberg who writes:

> "The one experience that best reflects the significant changes that have occurred in music education over the past decade is listening... Many music educators are still using rather limited strategies and activities to deal with one of man's most complex and revealing phenomenons--the aesthetic experience...
>
> What is needed is an approach to aesthetic listening that not only enables the student to learn about music but also encourages him to respond intellectually and affectively to the creative process that produced it."

ACTIVITIES

Fluency

Before listening to the following music example (the opening section from Schubert's Symphony No. 5 in B flat), describe the different ways you think the main motif could be used in the music.

Flexibility

1. After listening to the following composition ("Chester" from Schuman's New England Triptych), make up a series of questions that you think relate to what you heard. Remember, the more areas you touch on in your questions, the more flexibly you are thinking.

2. After listening to two different recordings of the same composition (the finale from Bartok's Concerto for Orchestra), describe what you think the second conductor did that was different from what the first conductor did. Which version did you find more satisfying? Why?

Elaboration

Listen to the music up to...(the gong at the end of Tchaikovsky's Symphony No. 2 in C minor ("Little Russian")). Keeping in mind what you have heard, describe how you would bring this work to an end.

SKILLS BEING DEVELOPED

Fluency, flexibility, elaboration

CONTRIBUTED BY

Reprinted with permission of Saul Feinberg, 8810 Blue Grass Road, Philadelphia, Pennsylvania 19152 from an article in Journal of Creative Behavior entitled "Creative Problem-Solving and the Music Listening Experience" Volume 11, Number 3, Third Quarter, pp. 158-164.

A PREPARATIONAL LISTENING LESSON

SUBJECT AREA

Music

OBJECTIVES

Students will be able to realize the importance of being open and flexible when listening to music.

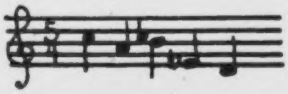
DESCRIPTION

Here is an activity involving "divergent listening" from Saul Feinberg, teacher at Lincoln High, Philadelphia, Pennsylvania.

ACTIVITIES

Preparational:

Familiarize the class with the following motif (from the third movement of Bartok's Music for Strings, Percussion, and Celesta):



Play a recording of the music and ask the class to listen for the motif.

Have individual students describe what they heard. Make note of some of the ideas they may have missed, such as the motif being repeated more than ten times; the motif being played backwards (retrograde); the motif being repeated twice as fast and twice as slow (diminution and augmentation); and the motif being played as a question-answer effect.

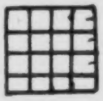
Ask the class why they did not detect all of these ideas. Lead to the realization that most of the students were unable to recognize these things (and others) in the music because they were limiting their listening to only the general sounds of the orchestra.

Exploratory-transformative:

Emphasize the necessity of going beyond what is obvious or familiar by giving the students a divergent-thinking problem to solve, such as the following:

How many squares do you see?

(By shifting one's perceptions, it is possible to county thirty squares of varying sizes.)



Replay the Bartok example to give students an opportunity to listen more divergently this time.

Ask the class to indicate other qualities they were able to perceive in the music. Replay the example to amplify the responses.

Synthetic:

Apply the realizations about "divergent listening" by having the class describe what they hear in another work (the third movement from Brahms' Symphony No. 4 in E minor, Op. 98).

Pose such "test" questions as these: Who can clap the rhythm of the main motif? Who can hum it? Who can play it on the piano? How many times was it repeated? How was it changed (inverted, played in a lower register, played pizzicato, played in minor, and so on)?

Reemphasize the idea that the perceptive music listener is one who is open and flexible in his listening.

SKILLS BEING DEVELOPED

Flexibility

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LISTENING LISTS

SUBJECT AREA

Music, Art

OBJECTIVES

Students will become aware of the many different qualities of different musical works.

DESCRIPTION

"The final meaning and the entire funding of meaning does not take place until the work of art has been experienced in its fullness and entirety."* Students can become aware of the interactions among the parts of a musical work through listening activities such as this.

ACTIVITIES

1. The more "fixated" the listener is on any one element in the music, such as rhythm, the less he is able to respond as a flexible listener. Here is an example of a listening task that calls for flexible thinking:

> While listening to the following work (the second movement of Hindemith's Symphonic Metamorphosis of Themes by Weber), place a check after any of the music qualities listed on your "Aural Flexibility List" (see below) whenever they reappear in the music. Each section will be indicated to you. Don't get "stuck" on any one quality.

AURAL FLEXIBILITY LIST

Music Qualities	Sections in the Music										
	1	2	3	4	5	6	7	8	9	10	
a change in tempo											
a melody in a low register											
melody against melody											
thick dissonant chords											
a crescendo											
a sudden change in volume											
a solo wind instrument											
a percussion instrument											
pizzicato											
a new theme											
a return to the "A" theme											
a question-answer effect											
number of qualities heard											

---

*Edmund B. Feldman. "The Nature of the Aesthetic Experience," in Report of the Commission on Art Education, edited by Jerome J. Hausman (Washington D.C.: National Art Education Association, 1965). p. 36.

2. Relating elaborative thinking to perceptive music listening involves tasks in which the listener indicates procedures needed to carry out various ideas through music.

> Refer to your "Music Qualities List" (see below) and write down the numbers of those qualities you think could be used to depict each of the following scenes (an approaching storm, the storm itself, the end of the storm). While listening to this selection (the fourth movement from Beethoven's Symphony No. 6 in F major), circle the numbers of those qualities that were used by the composer to give an impression in music of these scenes. (This type of musical "Bingo" activity could be adapted to numerous other elaborative listening tasks concerned with describing various music forms and contemporary styles.)

MUSIC QUALITIES LIST

Rhythm

1. Steady pulse
2. Irregular pulse
3. No pulse
4. Generally slow tempo
5. Generally fast tempo
6. Gradually slower
7. Gradually faster
8. A sudden change in tempo

Melody

9. Generally a stepwise melody
10. A very jumpy melody
11. A simple, songlike melody
12. A very elaborate melody
13. Melodic ornaments (trills, mordents)

Harmony

14. Generally traditional harmonies
15. Many dissonant harmonies
16. A "key" feeling (tonal)
17. No feeling of "key" (atonal)
18. Shifting "key" feeling (modulation)
19. Same texture throughout-generally thin
20. Same texture throughout-generally thick
21. Homophonic texture (melody against chords)
22. Polyphonic texture (melody against melody)

Dynamics

23. Gradually louder
24. Gradually softer
25. Suddenly loud
26. Suddenly soft
27. Many dynamic changes
28. Few dynamic changes-generally soft
29. Few dynamic changes-generally loud

Tone-Color

30. Solo tone colors
31. Small performance group (fewer than fifteen)
32. Large performance group (more than fifteen)
33. Electronic sounds
34. Pizzicato effects
35. Cymbal crash
36. Drum rolls
37. Traditional tone colors
38. Unusual tone colors
39. Very high or lwo registers

Form

40. Balanced ideas
41. Many repeated ideas
42. Question-answer effect
43. Only one section
44. Two or more sections (or themes)
45. "Freely" organized

3. In the culminating phase of the course, the synthetic phase, the student is given opportunities to integrate his listening behaviors and understandings by applying them to tasks that call for responses that involve synthesizing. In this state of perceptive music listening development, the student is encouraged to make aesthetic judgments when verbalizing about creative processes in music, when offering criticisms about specific works and performance interpretations, when distinguishing works that are banal from those that demonstrate creativity, and when formulating original listening guides and analyses of works of music.

SKILLS BEING DEVELOPED

Flexibility, elaboration, synthesis, evaluation.

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CREATE A COMPOSITION

SUBJECT AREA

Music

MATERIALS

Spinner illustrated below. (Alternate colors yellow and white on spinner.)

OBJECTIVES

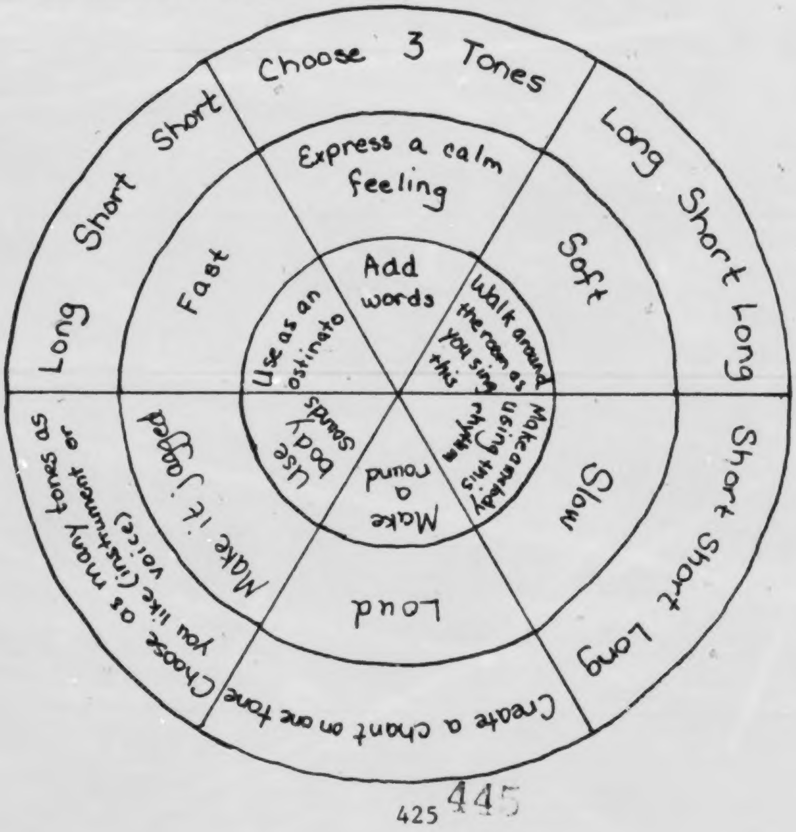
Students will be able to create an original composition by following the structure dictated by the spinning wheel.

DESCRIPTION

Sometimes all a student needs for a creative composition is a little structure - try the activity below.

ACTIVITIES

1. Spin.
2. Take instructions from the yellow space.
3. Spin again.
4. Take instructions from the white space.
5. Spin for the last time.
6. Take instructions from the yellow space.
7. From the instructions, create a composition.


Choose 3 Tones
Long Short Short Long
Short Short Long
Create a chant on one tone
Choose as many tones as you like (instrument or voice)
Long Short Short
Express a calm feeling
Soft
Slow
Loud
Make it Jagged
Fast
Add words
Walk around the room as you sing this
Make a melody using this rhythm
Make a round
Use body sounds
Use as an ostinato

VARIATIONS

Students may want to find existing compositions which follow their pattern.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation.

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FOLDED PAPER

SUBJECT AREA

Art, All

MATERIALS

Long paper.

OBJECTIVES

Students will be able to contribute to work of art by reacting to the contribution of the student before him/her.

DESCRIPTION

Students can take another student's idea and expand or embellish upon it thus adding their own unique individual touch to a delightful product as a whole! This technique can be used in all subjects.

ACTIVITIES

1. Fold a long piece of paper like a fan. If necessary, tape sheets together to make it long enough for a group.
2. The first person in group takes the folded fan and with only one surface exposed draws something in this elongated space that is decorative, intuitive, and fills the space well. When the drawing is complete, it is folded under so a clean surface appears and the same person trails a clue from their drawing onto the clean surface.
3. The second person receives the folded paper with just the trailing clue exposed and allows this single clue to inspire a drawing on this second space (without having seen the first person's drawing).
4. The third person continues on the third folded surface having received only a trailing clue from the second person and on and on around the group until all surfaces are filled.
5. When all surfaces are complete and the first drawing appears again, the cycle continues, only this time with verbal phrases rather than visual ones. But again, the trailing clue which might be one word or two, must stimulate the next person's thinking.
6. When all slides are completed verbally, choose a group reader to read the poem or present the poem as a group choral reading.

Now try the same group activity with cut paper images (collage, montage) instead of drawn images, and use cut out words from magazines. Follow all the steps, but this time choose the words at the same time as you choose the visual images.

VARIATIONS

Stories or poems may be written this way; again, only exposing the contribution of the preceding person. Or use single word associations and design work of art around them.

Science can use cause-effect relationships of nature. Math can use geometrical shapes or story problems.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation.

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PAPER NEGATIVE PHOTO PRINTS

SUBJECT AREA

Art, All

MATERIALS

Photo paper, felt tip pen, paper towels, overhead transparency projector, glass sandwich, ditto paper, developer, stop bath, fixer, developer tray, stop bath tray, fixer tray, water dishpan.

OBJECTIVES

Students will be able to make their own photo prints.

DESCRIPTION

These prints have a stunning effect and can be used to accompany any assignment where mood is desired or as an assignment by itself.

ACTIVITIES

Prepare and arrange materials:

1. General room setting
    - A. Shut all shades to stop direct sunlight.
    - B. Turn off most of ceiling lights while photopaper is being used.
    - C. Provide for traffic patterns which keep development materials at one side of the room and the exposure materials on the other side.
2. Drawing materials for each person
    - A. Glass sandwich.
    - B. Black felt-tip pen.
    - C. Paper towel.
    - D. Piece of ditto paper cut to desired size.
3. Exposure area
    This area should have an overhead transparency projector which is located in the outer edges of the room. The light should be directed toward a wall to prevent excessive exposure of paper being used in the drawing area.
4. Development area
    - A. 3 trays placed in a row.
    - B. 1 dispan at end of row.
    - C. Paper towels should be located.
    - D. Locate wastebasket near paper towels.
    - E. Pour developer in tray #1.
    - F. Pour stop-bath in tray #2.
    - G. Pour fixer in tray #3.
    - H. Fill dishpan 1/2 full of water.

Making a paper negative:

Make a drawing on white ditto paper with the black felt-tip pen:
- Rule 1: Any black mark will look white in final print.
- Rule 2: Any white area which is left will look black in final print.
- Rule 3: A space must be left between areas of the same color, i.e. snow man on snow.

Making the exposure:

1. Place the drawing on the cardboard side of the opened glass sandwich. Make sure the picture is top or front side up.
2. Slide a piece of photopaper under the drawing. Make sure the emulsion side is up. The emulsion side is identified by its slight blue coloration as well as its tendency to curve upward like a rocking chair rocker when the emulsion is on top.
3. Shut the glass over the two pieces of paper carefully so as to not move them when closing. Check to see if tape on edges of glass covers image. If either problem occurs, open glass and rearrange.
4. Pinch glass together and carry to projector. Protect photopaper from bright light by placing glass against body and cardboard to the outside.
5. Place glass sandwich on projector with glass touching glass. Turn projector on and county slowly to 10.
6. Return to drawing area and remove only the piece of photopaper.

Developing the print:

1. Quickly submerge the photopaper in the developer. Watch the print change but do not hold the print against the bottom of the tray. Blank spots will result where the fingers were applying pressure. When the background turns black (usually 10-15 seconds) remove from tray.
2. Place in stop-bath and count to ten. Remove from tray.
3. Place in fixer and allow to soak for 5-10 minutes. While waiting for the soak it is oftentimes possible to expose and develop additional prints. Remove from tray.
4. Place in water and allow to soak for 5-10 minutes. Remove from tray.
5. Pat dry between folds of a paper towel. Remove from towel and allow to air dry.

Special Notes:

1. About the photopaper.
   - A. The photopaper is called Kodak repro-negative ultra thin R-1. It comes in a 100 count box measuring 8½" x 11"
   - B. This paper is not sold through regular photo supply stores. It must be purchased through the graphics supplies division.
   - C. The times suggested in this presentation are a balance of time and general effectiveness. If archival quality is desired, the wash must be extended to at least 30 minutes in running water at a temperature of 65°F. to 80°F.

2. Making the exposure
    A. Exposure can be accomplished by any form of intense light source.
    B. Time of exposure must be determined for each light source by experimentation.
    C. Other materials may be used in place of the paper. Leaves, pressed plants, paper cut-outs, real film negatives, photographs may also be used. In other words, any material which may be used to control the amount of light which can reach the photopaper.
3. About the photochemicals
    A. The developer may be any of the following and diluted according to package instructions:
        (1) Kodagraph
        (2) Dektol
        (3) Ektaflo Type 1
    B. Stop bath with indicator turns purple when exhausted.
    C. Replace fixer whenever stop-bath is replaced.
    D. Water should be replaced at least once per hour per 30 students.
4. Creating the print
    A. A print which comes out too light:
        (1) Has not had enough exposure to light.
        (2) Was not left in developer long enough.
        (3) Was developed in developer which was:
            (A) Exhausted - usually indicated by a dark brown or grey color.
            (B) Too cold - should be used at room temperature.
            (C) Improperly mixed - used wrong amount of water for dilution.
            (D) Contaminated - the chemicals became mixed for some reason.
    B. A print which comes out black:
        (1) Has had the photopaper placed on top of the light resisting material instead of under it.
        (2) Has had exposure to light too long.
    C. A print which comes out of development with grey areas where white should appear usually:
        (1) Has had projector light shine on photopaper before being placed in glass.
        (2) Has been left out in room uncovered too long.
        (3) Is being used in room where sunlight is not blocked out.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation.

CONTRIBUTED BY

Carl Clark, District 66 Public Schools, Omaha, Nebraska.

SLIDES WITHOUT A CAMERA

SUBJECT AREA

All

MATERIALS

Slick magazine (Time, McCalls, etc.), 2 x 2" square of clear vinyl or slide mount, 2 x 2" square of contact brand clear transparent, warm water, spoon, scissors.

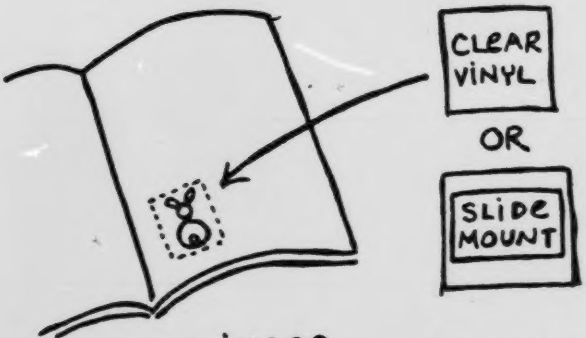
OBJECTIVES

Students will be able to make their own slides.

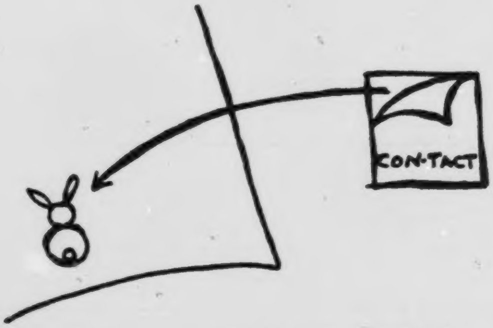
DESCRIPTION

Below is a simple 10-step procedure for making slides. This can be used as an opportunity for students to report information in any subject while satisfying a creative need at the same time.

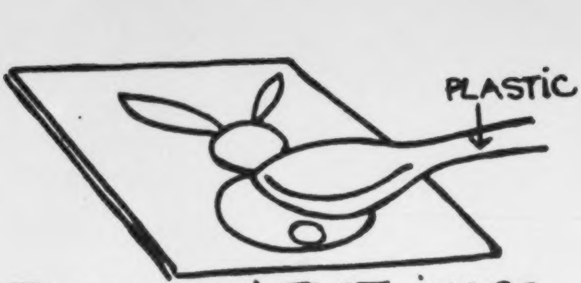
ACTIVITIES



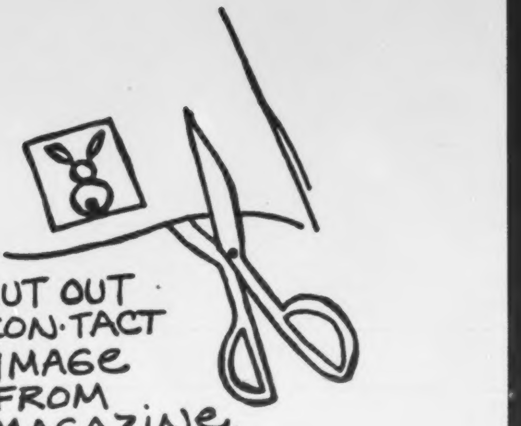
1 SELECT IMAGE (PICTURE, WORD, BACKGROUND) FROM SLICK MAGAZINE TO FIT THE VINYL SQUARE OR SLIDE MOUNT.



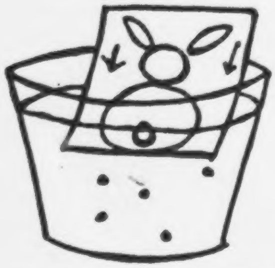
2 PEEL BACKING FROM CON·TACT SQUARE AND PLACE STICKY SIDE ONTO THE IMAGE YOU HAVE PICKED.



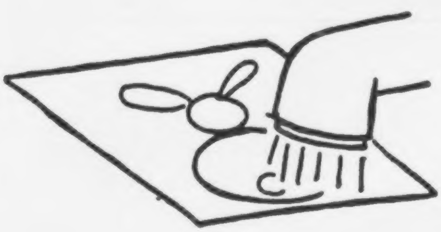
3 RUB CON·TACT IMAGE HARD WITH SPOON. MAKE SURE THAT CON·TACT MAKES GOOD, TIGHT BOND.



4 CUT OUT CON·TACT IMAGE FROM MAGAZINE.



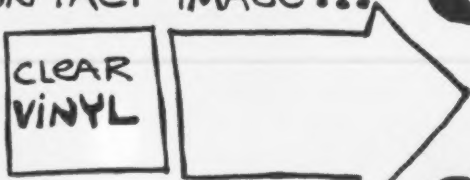
5 SOAK IN WATER UNTIL PAPER COMES LOOSE FROM CON·TACT (USUALLY SEVERAL MINUTES).



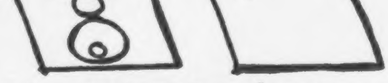
6 EXAMINE STICKY SIDE OF CON·TACT FOR WHITE CHALKY RESIDUE. WITH FINGERS RUB THIS OFF — THIS IS CRITICAL. RINSE CLEAN.

7A NOW YOU HAVE A CHOICE FOR MOUNTING THE CON·TACT IMAGE...

IF...



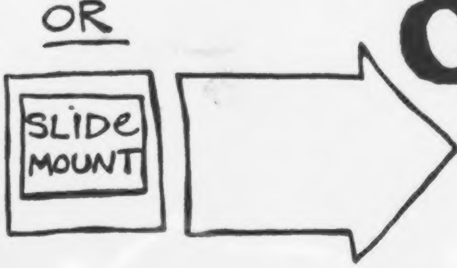
8A



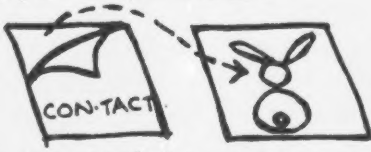
PLACE CON·TACT IMAGE, DULL STICKY SIDE DOWN ONTO A VINYL SQUARE.

7B OR

IF...

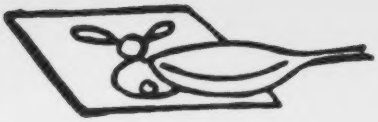


8B



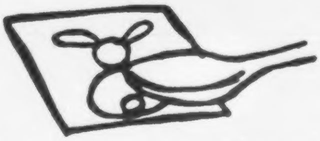
PEEL BACKING OFF OF ANOTHER PIECE OF CON·TACT AND ADHERE STICKY SIDE TO DULL, STICKY SIDE OF CON·TACT IMAGE.

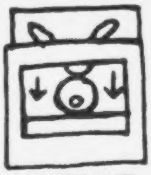
9A



RUB OR PRESS TOGETHER UNTIL ALL WATER IS REMOVED. THE SLIDE IS NOW READY!

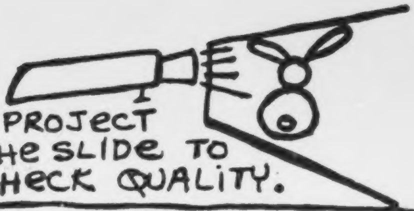
9B





RUB OR PRESS TOGETHER UNTIL ALL WATER IS REMOVED. TRIM TO FIT THE SLIDE MOUNT AND INSERT INTO MOUNT. THE SLIDE IS NOW READY!

10



PROJECT THE SLIDE TO CHECK QUALITY.

FOOTNOTES

- CLEAR CON·TACT BRAND TRANSPARENT IS SOLD BY THE YARD (18" WIDTH) AT DIMESTORES, GROCERY STORES, etc. FOR ABOUT 50¢ A YARD.
- "SLICK" MAGAZINES ARE THOSE USING CLAY-COATED PAPER. LIFTING OF IMAGES WITH CON·TACT CAN BE DONE ONLY WITH THIS TYPE OF PAPER. IF IN DOUBT, TRY IT.

SKILLS BEING DEVELOPED

Application, synthesis

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BUILDING BLOCKS

SUBJECT AREA

Art

MATERIALS

Poster board, paints and brushes, newsprint and pencil.

OBJECTIVES

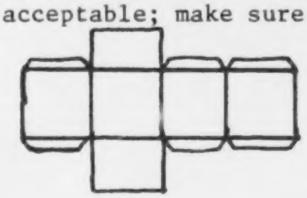
1. Working with color schemes.
2. Developing basic design skills.

DESCRIPTION

Students create building blocks utilizing different color schemes and designs.

ACTIVITIES

1. Each student selects one letter that appeals to him.
2. Create six different designs using letters. Be sure to incorporate the entire space.
3. Cut poster board as indicated below. Four inch to 6" squares are acceptable; make sure all six squares are the same size.



4. Transfer designs.
5. Use only one of the following color schemes on all six sides:
    a) Monochromatic
    b) Split Complementary
    c) Analogous
    d) Triad
6. Assemble the six sides to create a block.

VARIATIONS

1. Any type of design.
2. Different color schemes on each side.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation.

CONTRIBUTED BY

Don Byorth, Lincoln Southeast High School, Lincoln, Nebraska.

CONTINUOUS LINE DRAWING IN FOUR COLOR HARMONIES

SUBJECT AREA

Art

MATERIALS

12" x 18" paper suitable for painting, paints, brushes.

OBJECTIVES

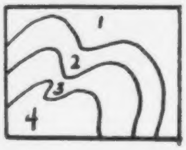
1. Improvement of drawing and painting skills.
2. Experience with different color harmonies.

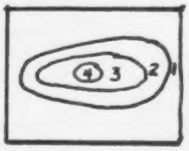
DESCRIPTION

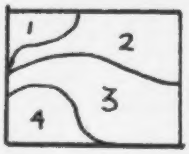
A realistic drawing will acquire an abstract quality as four color harmonies are included in the one painting.

ACTIVITIES

1. Develop a continuous line drawing composition. Any subject will do...possibly still life or stuffed animal.
2. Divide the drawing into four areas, not necessarily geometric:







3. Paint each of the four areas in a different color harmony; monochromatic, complementary or split complementary, analogous, triad or tetrad.
4. Keep one color the same throughout each of the areas.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation.

CONTRIBUTED BY

Chuck Schanou, Pound Junior High School, Lincoln, Nebraska.

SHAPE COMPOSITION

SUBJECT AREA

Art

MATERIALS

Colored construction paper, pencil, scissors, glue, several small 3-dimensional objects.

OBJECTIVES

1. An awareness of the overall shape of an object.
2. Working on drawing and composition skills.
3. Development of perception skills.

DESCRIPTION

This exercise encourages students to see the variety of shapes embodied in a single object.

ACTIVITIES

1. Have each student select one object.
2. Ask them to draw its silhouette on one piece of colored construction paper.
3. Using other sheets of paper, they are to repeat the process but to do it from a different angle. Ask them to do a minimum of five.
4. Coming back to the classroom they should cut out their drawings and arrange them on a sheet of newsprint. Overlapping and intertwining of the shapes should be urged.

VARIATIONS

Drawing silhouettes so that they overlap and work together.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation.

CONTRIBUTED BY

Anne Crabbe, Supervisor of Gifted and Talented, Nebraska Department of Education.

SOFT SCULPTURE

SUBJECT AREA

Art

MATERIALS

Fabric, needles, thread, stuffing materials, optional: buttons, yarns, trims, beads, sequins, etc.

OBJECTIVES

To work with an additive type of sculpture.

DESCRIPTION

This exercise takes sculpture away from the traditional materials and into the fun of fabric.

ACTIVITIES

1. Select a familiar object, such as a hot dog, a radio, a tube of lipstick.
2. Sketch object to desired size and develop a pattern from the drawing.
3. Cut fabric and construct by sewing. (Either by hand or machine).
4. Surface embellishment can be developed by adding buttons, trims, yarns, etc.
5. Stuff.

VARIATIONS

1. Any subject matter can be used.
2. Shapes can be developed into mobiles, as bed pillows, or simply as whimsical sculpture.

SKILLS BEING DEVELOPED

Knowledge, comprehension, application, synthesis, evaluation.

CONTRIBUTED BY

Anne Crabbe, Supervisor of Gifted and Talented, Nebraska Department of Education.

THE QUALITY OF LINE

SUBJECT AREA

Art

MATERIALS

Newsprint, drawing pencil, India ink and pen, charcoal, crayon, paints and brushes, several small objects.

OBJECTIVES

1. To emphasize the change in the character of a drawing by changing the quality of line.
2. To improve drawing skills.

DESCRIPTION

This drawing activity calls for imagination as students use different materials and line qualities to depict human personalities.

ACTIVITIES

1. Hand out small objects to students.
2. Ask them to draw their object as though they were a 90 year old person. They can choose whatever drawing instrument they want to gain the quality of line they desire.
3. Ask students to trade objects, and draw the second object as though they were a 300 pound weightlifter.
4. Continue. Some suggestions for other roles to play in developing line quality:
    - a) Felix Unger (of the "Odd Couple")
    - b) Muhammed Ali
    - c) A four-year-old child holding a melting popsicle in the other hand
    - d) Liberace
    - e) A mad scientist
    - f) Wonder Monds
    - g) Henry Kissinger
    - h) Archie Bunker
    - i) etc. etc. etc.
5. Encourage students to contribute roles.

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation, receiving, responding, valuing, organizing, characterizing.

CONTRIBUTED BY

Anne Crabbe, Supervisor of Gifted and Talented, Nebraska Department of Education.

DIVIDED SQUARE

SUBJECT AREA

Art

OBJECTIVES

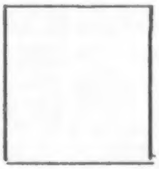
Students will be able to sequence and experience divergent and convergent thinking in order to generate fluency and variety.

DESCRIPTION

This activity is an example of the type of structured activities which can be included in an art program to develop visual thinking.

ACTIVITIES

Divide this square into four equal sections, (equal in *area* and identical in *shape*.)

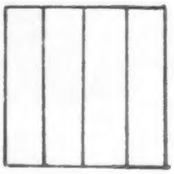


Principle: Cognition of problem is evaluated with a convergent thinking activity at lower levels.

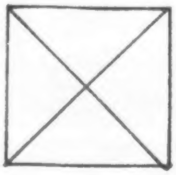
What other ways can you divide a square into four equal divisions? (Supply students with eight squares.) Principle: This is structured "fluency" - (divergent thinking). By providing ready-made squares you establish a minimum "quota." The advantage of a quota is that one *goes on* generating alternatives until one has *filled* the quota, and this means that if a particularly enticing alternative occurs *early* in the search, it is acknowledged but not considered a place to stop.

Having now made many experiements, you have noticed you can use

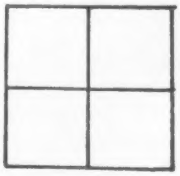
slices



diagonals



and small squares



Did you notice any other methods? What were they?

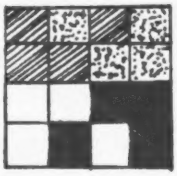
Give a visual example of this other method.

If you are provided squares divided into sixteen small squares, can you create some new ways to divide the square into four equal pieces? (Supply students with eight squares). Principle: You are allowing for "discovery" of principles, or "tricks" involved, which may or may not have been perceived as yet. This is a "clue" or trigger. Opportunity was given to begin verbalizing a concept, and to display it visually.

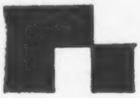
Can the squares be divided into any number other than sixteen?
Yes___ No___ Why, or why not?

Concept I: A square may be divided into equal fourths by dividing the square into sixteen smaller squares, and then putting the small squares together, four at a time, to make swastika shapes, "L" shapes, "T" shapes, diagonals, and so on.

Visual example:



Basic shape used:



Now can you improve on some of those you tried earlier? (Provide students with eight squares.) Principle: The student was prepared for this first concept. Both verbal and visual examples of the concept were provided. Further exploration was invited. The student is becoming aware that concepts, though "structured," increase freedom of choice and therefore allow greater potential for creativity.

Concept 2: Any line which passes from a point on the edge of the square to an equivalent point on the opposite edge and has the same shape on both sides of center divides the square in half. Each of those halves can be divided into equal halves by repeating the process at 90^{o}, or by simply creating equivalent shapes within each half.

Using this concept, how many ways can you divide these squares into four equal sections? (Provide students with 12 squares). Principle: The student is challenged to congitively grasp the meaning of the concept, and prove it by convergently dividing the squares as suggested. Divergence is then implied by the "quota" again - many squares given to work on. Once again the student discovers that when you conceptualize, you increase your options.

This exercise, discussed in 1970 by Edward de Bono, is a miniature version of what a good art program ought to be. It involves pure cognition in the understanding of the initial problem, "Divide a square into equal fourths." It involves convergence, in first asking for "one right answer" and later "the best solution." It involves divergence in setting quotas, asking for stimulating evaluations, and in pushing for more solutions based on understanding the principles involved. The students moved through a sequence of discovered principles involved.

The first problem to divide the single square into its fourths is convergent, but allows the teacher to make sure cognition is sufficient to go on.

The second problem begins by allowing the student some self-evaluation. (Did it look like this? ⊞ or this? ⊠)

This implies "no surprise - pretty standard solution," or "great, yours is not like these!" The student is "warmed-up" to be ready for a divergent thinking exercise. A quota was implied in order to encourage going beyond the most obvious solutions.

The third problem begins by summarizing the most simple principles, but still allowing for self-evaluation and discovery. A concept is introduced, providing squares broken into sixteen parts, to see what ideas that variation triggers. The student is pushed, by asking "can the squares be divided into any other way, or number, other than sixteen?"

Finally, the second concept is uncovered. Some students have already enjoyed the reward of discovering it. The others are now "ready" for it. This concept provides an almost infinite number of solutions--their ability to diverge is now at its maximum. The chances for creativity to occur are now much higher. Other "solutions" are given last, to provide stimulus and self-evaluation.

SKILLS BEING DEVELOPED

Fluency, flexibility, originality, elaboration

CONTRIBUTED BY

Steve Lahr, Art Consultant, Nebraska Department of Education.

DRAWING: REALISM AND ABSTRACTION

SUBJECT AREA

Art

MATERIALS

Newsprint, drawing pencil, fruit or vegetable (apples, peppers, squash are very good).

OBJECTIVES

1. To aid the student in the concept of abstraction.
2. To improve drawing skills.

DESCRIPTION

This drawing activity asks students to abstract from their original drawings.

ACTIVITIES

1st Half of Period:

1. Students draw piece of fruit realistically. Fill up whole sheet of newsprint.
2. Draw fruit from different angles.
3. Cut fruit and draw inside.

2nd Half of Period:

1. Abstract from the original drawings.
   Some suggestions:
   a) elongate the drawing
   b) widen the drawing
   c) combine and overlap drawings
   d) tear construction paper and adhere to paper; combine with line

VARIATIONS

1. Any subject matter.
2. Any method of abstracting.
3. Approach it from "styles" of art: Cubism, Futurism, Expressionisms, etc.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation.

CONTRIBUTED BY

Anne Crabbe, Supervisor of Gifted and Talented, Nebraska Department of Education.

BLUEPRINT EXPOSURES

SUBJECT AREA

Art

MATERIALS

Paper (Strathmore Alexis drawing or Unbleached muslin) Chemicals: Potassium Paracynide, Ferric Amonium Citrate, objects.

OBJECTIVES

An awareness of shapes, an exposure to a new technique.

DESCRIPTION

By placing objects on blueprints and exposing them to light, designs are created by the silhouettes.

ACTIVITIES

1. Mix chemicals as follows: 1.3 gr. potassium paracynide, 3 gr. Ferric amonium citrate, 1 ounce water. (Should cover about 10 sheets of paper.)
2. Brush on paper or soak muslin in the solution.
3. Hang to dry in darkened area.
4. Arrange objects on the paper and expose them to sunlight (5-10 minutes in summer, about 20 minutes in winter). Cloth takes longer.
5. Soak paper or cloth in water until yellow is gone.
6. Hang to dry.
7. Shapes of objects should be silhouetted against the paper.

VARIATIONS

Expose arrangement to spotlight for 3-5 minutes.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, synthesis, evaluation.

CONTRIBUTED BY

Anne Crabbe, Supervisor of Gifted and Talented, Nebraska Department of Education.

BALANCE

SUBJECT AREA

Art

MATERIALS

Pencil and paper, construction paper, scissors, glue.

OBJECTIVES

1. To develop an awareness of the balance in both natural and man made objects.
2. To introduce the student to balance as a basis of design.
3. To reinforce concepts of shapes, color harmony.

DESCRIPTION

Two activities involving the principle of balance are included; one involves perceiving balance, the second creating designs using the three kinds of balance.

ACTIVITIES

Balance Hunt

1. Review radial, asymmetrical and bisymmetrical balance with class.
2. Divide into groups of 4-5.
3. Students are to go on a "balance hunt." They should look for examples of the three types of balance, and record each find; for example: radial: 4 leaf clover.
4. Give them 15-20 minutes to look and record, then about 10 more minutes to compile their team findings (repeats count only once)
5. Score 5 points for radial, 3 for bisymmetrical, and 1 for asymmetrical examples.
6. Each team reads their list and highest point team wins.

Balance Designs

1. Using cut construction paper, each student is to develop 3 simple designs employing each of the 3 types of balance.
2. Place restrictions on the designs as:
    - a) Of the 3 designs, one should be all organic shapes, another of all geometric shapes, and the third of both organic and geometric shapes.
    - b) Of the 3 designs, one should be of an analagous color scheme, the second of a complementary color scheme, and the third of a monochromatic scheme.
    - c) Etc.

VARIATIONS

1. Use paint rather than construction paper.
2. Use the same number and size objects for each design. If this is the case, each shape used should be cut 4 (or 8 or 12) times for each design.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis, application, synthesis, evaluation.

CONTRIBUTED BY

Anne Crabbe, Supervisor of Gifted and Talented, Nebraska Department of Education.

FILMMAKING

SUBJECT AREA

Art

MATERIALS

Water proof felt pens, film, film projector.

OBJECTIVES

An exposure to film making.

DESCRIPTION

An introduction to filmmaking, this activity assists in the understanding of moving pictures.

ACTIVITIES

1. This exercise can be done at the same time as another. It takes very little time to accomplish.
2. Lay film out on table and have each student work on 100-150 frames creating their own moving sequence (20 frames = about 1 second). Use water proof pens; felt pens that are not water proof will work, but the results are splotchy.
3. Remind students to vary their designs only slightly and to use simple designs.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation.

CONTRIBUTED BY

Anne Crabbe, Supervisor of Gifted and Talented, Nebraska Department of Education.

DRAWING FROM MEMORY

SUBJECT AREA

Art

MATERIALS

Newsprint, drawing pencil, 25 small objects, 25 blindfolds (the number of small objects and blindfolds will vary with the size of the class).

OBJECTIVES

1. Developing an awareness through the sense of touch.
2. Developing drawing skills.
3. Heightening the powers of observation.

ACTIVITIES

1. Have students blindfold themselves.
2. Hand out one small object to each student.
3. Let students handle and "study" their objects for a few minutes before you pick them up (and keep them out of sight.)
4. Students then draw their objects from memory.
5. When drawings are complete, let each student retrieve his own object and compare it to his drawing.
6. Repeat the exercise using different objects.

VARIATIONS

1. Have students draw the object a second time as they look at it. Compare drawings.
2. Any materials.

SKILLS BEING DEVELOPED

Knowledge, comprehension, analysis.

CONTRIBUTED BY

Anne Crabbe, Supervisor of Gifted and Talented, Nebraska Department of Education.

ARTS TEAM

SUBJECT AREA

Art, Music, Dance

OBJECTIVES

Students will be able to explore ways in which the three arts intertwine and depart from each other.

DESCRIPTION

The Nebraska Arts Team under the direction of State Art Consultant Steve Lahr, has coordinated some exciting experiences involving dance, music and visual arts. Here are some brief descriptions of their activities.

ACTIVITIES

Focus on creating:

Problem: Divide into groups of six. Create a "Found Sound Composition" by searching for objects in your purse or pocket that make an interesting sound. Explore the various sound possibilities of each object - you may use body sounds, also. Arrange the sounds into an aesthetically pleasing composition with the following structure . . .

Choose a sound to serve as a unifying element - make it repeat.
Use various dynamic levels (loud-soft).
Use various textures (some sounds together - some alone).

Record your compostion. YOU HAVE 10 MINUTES! ! !

Create a Sound Mural by representing in visual terms on large sheets butcher paper with felt pens the sounds you have used and their arrangement in time. YOU HAVE 10 MINUTES ! ! !

Create a movement improvisation that represents your musical and visual are composition. YOU HAVE 10 MINUTES ! ! !

Perform your arts improvisation for the entire group.

Use words to help stimulate imagination, aid vocabulary, and structure creativity in the arts........

bouncing
bumping
exploding
flying
floating
gliding
going-coming
growing
pulsating
revolving
rocking
rolling
rotating
shrinking
soaring
slithering
spinning
starting-stopping
swaying
willowy
thrusting
tilting
tumbling
vibrating
withering
swirling
oozing
bubbling
slicing
trembling
darting
hovering

SKILLS BEING DEVELOPED

Analysis, application, synthesis, evaluation.

CONTRIBUTED BY

Sheila Brown, Music, University of Nebraska; Milt Heinrich, Art Education Professor, Dana College, Blair, Nebraska; Lisa Circo, Dancer, Artist in Residence, Omaha Children's Theater, Duchesne High School, Omaha, Nebraska.

All are members of the Nebraska Arts Team under the direction of Stephn Lahr, Nebraska Art Consultant.

WILLIAMS' GEMS

SUBJECT AREA

Arts

DESCRIPTION

Below are a few ideas for activities from Frank Williams' Classroom Ideas for Encouraging Thinking and Feeling, D.O.K. Publishers (full information below). Each specifies which element of creativity is being developed-first its cognitive component, then its affective component. Teaching strategies are also specified.

ACTIVITIES

To Encourage: Curiosity
Through: Arithmetic; music
Using: Strategies No. 3 - Analogies
No. 16- Creative listening skill

One teacher discussed how music depends upon arithmetic. One specific example was how the division of notes is related to fractions. Recordings of different types of music and different rhythms provoked a great deal of enthusiasm and sensitivity to the idea that time (beat) is to music as division is to arithmetic. This understanding of the principle of the division of musical notes was a good beginning for subsequent arithmetic lesson on fractions.

****

To Encourage: Original thinking and imagination
Using: Strategies No. 2 - Attributes
No. 11- Intuitive expression
No. 8 - Organized random search

To celebrate National Book Week all of the students in this class had a book parade. The children were divided into groups and were to illustrate their favorite book. Original costumes were designed as characterizations of the book's story were portrayed. Each of the groups presented their own "favorite book dramatization" and the other children guessed what book was being presented. A panel of judges from another classroom awarded prizes for the best and most unique book dramatization.

****

To Encourage: Original and elaborative thinking
Using: Strategies No. 8 - Organized random search
No. 11- Intuitive expression
No. 18- Visualization skill

The class had been discussing how they might make the news and educational TV programs more interesting. The teacher suggested the narrative, serial approach, (soap operas) to "hook" the audience like daytime TV programs. Instead of having several stuffy-looking experts sitting around a coffee table discussing a "crisis" which is terribly dull and boring, the "crisis" could be programmed in a more interesting perspective by having a continuing dramatization of it. The students felt that they liked stories about people with whom they could identify. So this class picked a current news or educational topic and created a serial drama about it. Costumes and scenery were devised by the children after their script had been planned and written in narrative form. The class then presented their new type of TV program for several other classes in the school.

****

To Encourage: Original thinking and imagination
Using: Strategies No. 8 - Organized random search
No. 18- Visualization skill

The class was asked to make blueprint floor plans to scale. Instead of making a plan of a typical house, they were encouraged to use their imaginations and make a blueprint of something different like the plans for a flying saucer, a dream boat, a fall-out shelter, etc. Floorplans from newspapers and magazines were used as guides. The children made many unusual plans of space ships, dream rooms, way-out recreation centers, castles; etc. Later the class added dimension of length, width, and area, all to scale. Some students even made three dimensional models.

****

To Encourage: Curiosity and complexity
Using: Strategies No. 2 - Attributes
No. 3 - Analogies
No. 14- Evaluate situations

A music class had studied folk music of the Civil War era discussing the type of music produced by the most noted musicians of that period. The teacher pointed out how musicians of today also seem to have a message to convey through their compositions. The class was then requested to think about some of their favorite and contemporary composers and to compare their personal qualities to the earlier song writers. After lists of traits of song writers of both eras were produced, the class discovered a great number of similarities between them.

SKILLS BEING DEVELOPED

Below is a list of Frank Williams' teaching model:

PUPIL BEHAVIORS

Cognitive	Affective
Fluent thinking	Curiosity (Willingness)
Flexible thinking	Risk Taking (Courage)
Original thinking	Complexity (Challenge)
Elaborative thinking	Imagination (Intuition)

TEACHER BEHAVIORS

1. Paradoxes
2. Attributes
3. Analogies
4. Discrepancies
5. Provocative Questions
6. Examples of Change
7. Examples of Habit
8. Organized Random Search
9. Skills of Search
10. Tolerance for Ambiguity
11. Intuitive Expression
12. Adjustment to Development
13. Study Creative People & Process
14. Evaluate Situations
15. Creative Reading Skill
16. Creative Listening Skill
17. Creative Writing Skill
18. Visualization Skill

CONTRIBUTED BY

Reprinted with permission of D.O.K. Publishers Inc., 71 Radcliffe Road, Buffalo, New York 14214. From Classroom Ideas for Encouraging Thinking and Feeling (1970, $7.50) - Frank E. Williams.

ARTISTIC EXPLORATIONS

SUBJECT AREA

Arts, All

OBJECTIVES

Various.

DESCRIPTION

Below is a list of possible explorations in various medias. Several could be used in each of the subject areas to enrich approach and develop a broader spectrum of student talents.

ACTIVITIES

Photographic Explorations:

The following activities may be conducted using photographs from magazines and newspapers or using photographs taken by students. If the latter technique is used, give the students a quick overview of how the camera is operated (contact local camera shop for directions) cautioning them to request permission to take photographs and to respect the wishes of people. Then allow them to move into "the field."

Encourage students to explore the commonalities of the human experience by focusing on peoples:

- engaged in the same type of activity (work, play, rest, etc.), or
- expressing the same emotion (fear, anger, happiness, tenderness, etc.)

An important insight into both commonalities and differences can be gained from focusing the camera's eye on environmental objects and the responses of people in those environments.

e.g. As people enter the foyer of a government building, a hospital, theater, train station; as people move into a darkened building, find themselves in a small space, in an open park, at a bargain counter, etc. Encourage the students to notice the common reactions regardless of race, sex or ethnic background.

If it is impossible for you to take students on location, provide a location or situation for them.

e.g. Enlist the help of students whose understanding and concept development is at a more sophisticated level in dramatizing a situation or simulating a place. Your students may then photograph the actors responses catching facial expressions, body language or movement.

or

Have each student choose a classmate and photograph that classmate so that "the essence" of the individual is caught. Examine the attitudes that led the student to 'capture' his/her classmate as he/she did.

or

Suggest that the students photograph the route from school to home. If this were done over a weekend, they could photograph a specific spot in their neighborhood at different times during the day.

Further insight as to human response can be gained from categorizing:

- photographs (either from newspapers and magazines or using those taken by the students) under verbal expressions of feelings.
- photographs and recorded sounds
- photographs under topics or themes (work, play, community activities)

Graphic Explorations:

The following explorations are designed to encourage students to see their environments and each other with more discernment.

- Collect rubbings

  A rubbing can be made of any surface. Even a smooth surface will cause a distinctive marking to appear on a sheet of smooth, soft paper when it is rubbed with a soft crayon or chalk. A very brief trial rubbing over a coin or surface within the classroom will give the students the expertise that is needed.

By limiting the "field" to first one type of place and then another -- a rundown neighborhood, a park, the townsquare, the interior of a school-- sets of rubbings can be gathered that are representative of the environments. Their attention should be focused on finding the representative textures and recording them through making the rubbings. They should be encouraged to make initial connections of ideas with the textures of a place.

- Collect Objects

  Objects found in a particular setting (a home, a park, a forest, a city neighborhood) can describe that location with the force of vivid reality. Thus, "collecting" activities can be useful in helping students recognize their environment anew and can provide opportunities for discussing the effect of environment on human experiences and attitudes.

  In this activity, students may begin by collecting at random objects found in a specified area. As they begin to associate the visual and tactile characteristics of the site, they should be encouraged to make conscious choices about what is collected, in other words, to establish themes for the collections. They later may arrange the items aesthetically, but for this purpose, the hodge-podge of paper, flattened cans, stones, a stalk of ragweed, a battered hubcap and other debris may very well represent "Our Park" and it may be the first time the students ever felt it or took a clear look at it.

This type of activity and many of those that follow may be done in many settings.

- Make Contour Drawings

A contour drawing is made with any tool that will make a mark on a surface (chalk, felt tip, a finger in the steam on a window, a toe in the dust or a knife in clay, charcoal, pencil). It requires that the person decide on a beginning point, touch the surface with the tool and, without looking down at the surface, move the tool to correspond with the path the eye follows around an object or person.

The fact that, once the drawing is begun, the tool cannot be lifted nor changes made encourages the student to look with especial care at the subject to put themselves into the person's situation, to see with empathy, to feel "sympatico," to "see" what they have previously taken for granted or perceived only generally. For example, a person who has before been recognized only as a black, a white, a Puerto Rican, a girl or boy must now be examined as an individual with particular group and particular individual traits.

An interesting aspect of contour drawing is the fact that no matter what level of drawing proficiency may exist, distortions will occur. Such distortions frequently provide opportunities for discussing differences among settings and individual people and may lead into profitable examinations of the difference between a stereotype, a bonefide group trait and individual variations. Students may discover, for example, that not all girls have delicate features, not all Indians have high cheek bones.

- Make Gesture drawings

These are done very quickly with a series of broad strokes that suggest or express a movement, a gesture, a posture. Chunks of chalk, charcoal or crayon may be held so that the side comes in contact with the paper.

If several of these drawings are done on a single sheet of paper with some of the figures overlapping others, the essence of an argument, the excitement of a game, the feeling of relaxing can be represented.

Since there is no emphasis placed on anatomical exactness in either contour or gesture drawings, everyone can participate.

- Make Sketches

  Again the emphasis is on seeing what is there, looking for shapes that may be repeated over and over (as in a row of three-story party-wall houses), looking for areas of shadow, areas of missing house sidings and shingles, and very quickly, with broad and narrow strokes, capturing the observed pattern or lack of pattern.

- Make Ink and Wash drawings

  The color in this instance is used to project or reflect the feeling of the place or the people. It is not used to give realistic appearances to things. It is swished on with wide brushes and is quite watery. The ink may be applied with brush or pen to bring out certain shapes or details or to accent certain patterns.

In all the graphic explorations it is important to emphasize that the drawings should mean something to the person doing them. At this point it is not necessary that other people 'read' the same meaning.

Some students may want to share their drawings with others. Some may want to follow-up their drawing experience with painting or sculpting, weaving and stitching a wall hanging, constructing a collage or mobile. Those students should be encouraged to follow their inclinations.

Movement Explorations:

Through movement explorations the students are once again asked to focus their attention on their environment and the ways that the objects and people in that environment move. They will discern the subtle variations of that movement as it reflects the feelings of the people as they (the people) behave within a given situation. They will discern the effects of machinery sounds on people, people on people and people on things. Through these activities students will be encouraged to discover their own feelings and ideas--and those of their classmates--in new ways.

- Communicating Without Words

Only gestures, general body position and movement may be used to communicate a feeling or idea. You may want to limit the gesture or movement to a specific part of the body; i.e., use only the hands to show joy, only the legs to show frustration, only facial expression to show anger. The game "Body Talk" - a Psychology Today game is one that may be used effectively for this experience. Another game-like example is "Creating Characterization" - Aesthetic Education program, CEMREL.

- Mimicing Characteristics

Again only gestures, body attitude and movement are used. However, in this experience a complete series of actions may be worked up so that an idea is communicated rather than a single emotion. Could be tied in with photography experience of capturing the essence of the individual.

- Inventing a Machine

Begin with one person who establishes a rhythmic movement. However, in this experience a complete series of actions may be worked up so that an idea is communicated rather than a single emotion. Could be tied in with photography experience of capturing the essence of the individual.

- Inventing a Machine

Begin with one person who establishes a rhythmic movement. Although sound may be used, it is not essential. Others join one by one as adjuncts to or in opposition to the established rhythms and movements. You may want to divide a large group into smaller units so that the machines do not become unwieldy. However, if this unwieldiness is the point of the exploration, the way people can become lost in a machine, you may want to have the entire class incorporated into the machine. The important aspect of this activity is the need for one person to relate completely with another so that they "feel" the movement, the intent of the other. If this does not happen the machine will probably break down.

- Spontaneous Movement (overcoming inhibitions)

*Using sounds of varying characteristics (grating machinery, horns honking, rivet guns, clapping hands, instrumental or vocal sounds) ask students to reflect what they hear in their movements. This should be as spontaneous as possible.

*Using various sizes of space (confining, box-like, long narrow hallways, open gym or unfurnished classroom, cluttered room, outdoors) ask students to reflect the way they feel in the space through their movements. "Show-me-in" is a movement activity that may be used. After initial introduction to a space, a student shows another student inot the space at the same time exhibiting his or her feelings about the place.

*Using items having various textures (silky scarves, shaggy bark, shiny metal, sponges) ask students to reflect the way the object felt to the touch through their movements.

*Using items of various shapes (balls, cylinders, squares, triangles, rectangles, cones) ask the students to reflect the shape of the item through their movements.

You may want to combine several of these (squares covered with sand paper, cones covered with wire mesh) for a more complicated movement experience. The purpose of such experiences is to lead students to recognition of effects of space, texture, light and sound on people and to recognition of movement as an expressive medium.

. Mirror Image

The goal for this movement exploration is for the student to progress from simple anticipation, without verbal cues, of what the other person will do to that ensemble action which makes it impossible for the observer to determine at any moment which participant is the "leader" and which the "follower."

Sound Explorations:

There are many sounds around us and within us that we never hear because we either block them out or because we don't listen with concentration. The following experiences are designed to overcome that hearing problem and to help students to become discerning perceivers of sound.

. Sounds Around Us

Using a portable tape recorder, record the sounds in a series of locales. Note where and when each tape was made. The students may want to coordinate these tapes with the categorizing of pictures as mentioned in "Photographic Explorations" or with some of the "Movement Explorations."

. Listening

Concentrate on hearing and differentiating various sounds--people walking, hands clapped on different parts of the body, vocal intonations, etc. Begin with those coming from within the person, then those close at hand, then those that are farther and farther away. You may want to add some planned sounds to provide variety, a contrasting rhythm or pitch to those sounds that are normal for the place where the students are. Again, you may want to coordinate this experience with some fo the "Movement Explorations."

. Explosive Words

Students form pairs. One is the initiator, the other is the imitator. The initiator says (whispers, shouts, speaks appropriately) a word or syllable, a letter or number. The imitator repeats the word and intonation as quickly as possible--mimicking the tone of voice, inflection and emotional implications.

. Say It With Numbers

Each student chooses three separate emotions and conveys each only by saying a number phrase, such as, "three hundred and thirty" in the appropriate tone. Nonsense syllables, other sets of numbers or musical phrases may also be used.

. Sound and Motion

One person begins a vocal sound and a motion; he chooses another person who must imitate his sound and motion exactly. When second person is ready he or she (No. 2) proceeds to find another, etc.

- Sound and Rhythm

Establish groups of five or six people. Play music or have students compose a rhythmical chant or melody. As students grip a window pole (to keep them all together) have them begin their "chant" and to begin moving appropriately in consort. As movement pattern becomes comfortable have students remove one hand and place it on the shoulder of the next person. Finally, remove the pole entirely. Group continues moving in established pattern.

All of the above mentioned activities will lead to concentrated listening and later interpretive work.

Drama Explorations:

Probably one of the most potent media available to us as we work toward positive interpersonal interaction is creative drama. It brings people into direct relationships with people and the causes of human responses to places, things and situations. The following are a few examples of such direct relationships:

- Emotion

Divide total group in half. Give one half a theme such as war, love, prejudice, temptation, greed, etc. They improvise a mime around the theme, watching each other carefully, making the improvisation a group effort. The other half watches, trying to decide on the emotion or idea being shown. (Note, improvisation group is not to tell a story)

- Spectators

Divide class into small groups. Each group chooses a place and the appropriate spectator actions which are then mimed by the group. Other groups decide where and what is going on.

- Weave a Web

Give each student a loop of string. Divide class into groups of three or four. Using all parts of the body to manipulate the string, work as a single unit to create free form designs without tangling the strings. This experience could provide an additional movement exploration and, if coordinated with sound, could serve as a Drama/Movement/Sound exploration.

- Space Shaping

Form teams of two or more. One at a time each team shapes, then uses or handles an object from the space substance that surrounds them. Object is not to be predetermined. It comes from working together and watching each other carefully. This activity is non-verbal.

- Slow Motion Tag

Entire class plays game of tag in slow motion.

- Slow Motion Fight

Two students begin a face to face encounter keeping all movements in slow motion, creating the reality of a fight by working together.

- Mirror Tag

Students stand in circle. One person is "It" and stands in the circle. A second person is chosen secretly to lead the circle students in actions and rhythmic patterns. "It" must identify who is the leader.

Again, it will be noted that no production is involved. No scripts are necessary. No costumes and very few props are needed. The emphasis is on the person and what he or she does to perceive the intricacies of the human experience.

Film Explorations:

Film is a contemporary medium that is destined to grow in stature among the arts. In exploring with film, concern yourself with pointing the camera and shooting for a particular purpose. Use your imagination and try many variations using only a camera and film.

1. Explore one object with the camera and make it come alive by trying different camera positions, shooting through various materials such as cellophane, nylon stocking, etc., or moving the camera - changing visual image and impact.
2. Focus on a specific human motion such as walking, running, jumping, etc., or the actions of hands working. (may be allied with movement for interpretive and communicative purposes.)
3. Explore the actions of people in their environment as objectively as possible making sure that these are shot in order. (may be connected with photographic sequencing.)

   Using multiple copies of the same magazine divide into small groups and arrange pictures from that magazine (on separate pieces of paper) in a sequence that tells a story.

SKILLS BEING DEVELOPED

Application, synthesis, evaluation, analysis.

CONTRIBUTED BY

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SYMBOLIC SHIELDS

SUBJECT AREA

Social Studies, Art, All

MATERIALS

Colored construction paper and paints or marking pens.

OBJECTIVES

Students will be able to:

1. Identify their feelings of pride, joy, fear and love.
2. Symbolically represent these feelings in their code of arms.

DESCRIPTION

Students are asked to design their own shield representing code of arms.

ACTIVITIES

1. Display the following diagram somewhere in the classroom:

(Perhaps you will also want to exhibit some sample shields, ways to divide shields, marks of cadency--all can be found in encyclopedias).

2. Introduce shields:
The custom of bearing symbols on shields existed in ancient times and the Middle Ages. Heraldic symbols as we know them were used during the latter period when suits of armor made it difficult to otherwise distinguish friend from foe.

Symbolism was a vital force in the thoughts and actions of medieval times and knights naturally chose symbols as their marks of identification. The symbols usually commemorated an event in the knight's life or some outstanding quality. Symbols have also come to be used to represent feats in tournaments and pageants or to depict a person's ancestry. Almost anything that can be symbolized in color and form may be used -- divine beings, people, animals, monsters, natural and man-made objects.

3. Choose one of the colored construction papers for the field of your shield.

4. Design a shield for yourself using symbols to represent the following:
   a. Something you are proud of.
   b. Your most outstanding quality.
   c. Your most distressing quality.
   d. Something that gives you a great deal of joy.
   e. Anything else you would like to include.

5. Share and discuss products.

6. Further study of heraldry should be encouraged. Perhaps students would like to develop their own set of symbols for different identification purposes (e.g. the "marks of cadency" depict position in family such as sixth son, etc.).

VARIATIONS

Students could be asked to bring something to class which symbolizes something they are proud of, their most outstanding quality, etc.

Students could be asked to design a school or class crest out of which one could be chosen for T-shirts, flags, etc.

SKILLS BEING DEVELOPED

Divergent production of symbolic units.

CONTRIBUTED BY

Melodee Landis, Nebraska Department of Education, 301 Centennial Mall South, Lincoln, Nebraska 68509.

WHAT'S YOUR BAG

SUBJECT AREA

Art, All

MATERIALS

Paper bags for all, paste, magazine, scissors, stapler.

OBJECTIVES

1. Use a visual illustration to represent self and values.
2. To provide an opportunity for some jovial "cutting and pasting"
3. To build inclusion and influences.

DESCRIPTION

Each student decorates his bag as a personal collage, then share their products.

ACTIVITIES

Pre-planning

1. Give overview of today's activity. State expectation clearly.
2. Plan for helpers to distribute materials and plan for a clean up time.
3. Plan very specific directions.

Instructions

1. Meet in small group.
2. Distribute materials.
3. Each student makes his bag into a personal collage, using pictures and phrases from magazines. The outside represents one's public image, values and choices. The inside contains one's private world.
4. The bags may be stapled shut to insure privacy for the inside world.
5. Group members take turns sharing outside of bags offering rationale for some choices; each member may or may not share a part ot the inside world at time of activity or later date.

Discussion of Activity

RL..What did you like about this activity?
CS..What are some reasons this was a good activity?
CF..What things worked well?
CS..What are some reasons things worked well for your group?
RL..What did you find out that you didn't know before?
EF..What are some reasons we should do more activities like this one?
AN..What are some ways we could change this activity to make it better? How would that change make it better?
SM..How was this activity like other you have done? How was it different?
..Other

Discussion of Process

RL..What things helped your group work well? Why did that help your group?
RL..What did you like about the way your group worked?
FL..What were some of the feelings that you had during this activity?
CS..What are some of the reasons you felt that way?
CO..What (positive) things will we want to remember the next time we have group work?
EF..What do you think might be the purpose/effects of an activity like this?
SM..What feelings did you have today during this activity that were like some you have had before?
..Other

Validation of Others

Suggest that members validate, saying:
"I liked it when..."
"It was helpful when..."
"I felt included when..."
"One neat thing about our group was..."
"Thanks...for..."
"It was very important to me when..."
Other

SKILLS BEING DEVELOPED

The abbreviations to the left of each question are for the Lincoln Public Schools BASICS mental operations:

OB--Observing
RL--Recalling
DF--Noting Differences
SM--Noting Similarities
OR--Ordering
GR--Grouping
LB--Concept Labeling
CF--Classifying
CS--Inferring Causes
EF--Inferring Effects
FL--Inferring Feelings
CO--Concluding
QS--Questioning
AN--Anticipating
MC--Making Choices

CONTRIBUTED BY

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TEAM PICTURES

SUBJECT AREA

Art, All

MATERIALS

Large paper for each group. Plenty of crayons, paints, chalk, any miscellaneous materials for three-dimensional work.

OBJECTIVES

Students will be able to understand fellow members and the feelings that others have in a new situation.

DESCRIPTION

Many teachers prefer their classes to work in groups. This often calls for each participant knowing and understanding the other members of the group. Here is an activity which may enhance group work by "breaking boundaries."

ACTIVITIES

Time: Approximately 40 minutes.

Description of Task: Divide the students into groups of 4 to 6 members. Read the following material.

As a team, please paint a team picture using the following criteria:

1. The painting should be creative.
2. The painting should integrate individual efforts.
3. The painting should reflect the personality of the team and its members.
4. Sign your team painting with a team name.

After the pictures are completed, explore the feelings of members relative to the painting; some possible areas for comparison of feelings are:

1. Embarrassment and shyness about painting.
2. Feelings of artistic inferiority.
3. Uneasiness about being in a new group.
4. Fears of exposure.
5. Feelings of pleasure and enjoyment.
6. Who got the choice spot on the painting?
7. Did anyone paint over another person's work?
8. Did some get a better deal than others during the painting?
9. Did wit or humor appear? Why?
10. How was conflict handled?
11. Did anyone drop out from the group?

SKILLS BEING DEVELOPED

Synthesis

CONTRIBUTED BY

Source unknown.

BUMPER STICKER

SUBJECT AREA

Art, All

MATERIALS

Paper strips, colored markers, crayons, etc.

OBJECTIVES

1. To give opportunity for presentation of self.
2. To build inclusion.
3. To encourage effective listening.

DESCRIPTION

Students create their own bumper sticker and share feelings.

ACTIVITIES

Pre-planning

1. Give an overview of today's activity. State expectation clearly.
2. Plan for distribution of material.
3. Model a bumper sticker the day you will be doing the activity.

Instructions

1. Give each child a long strip of paper and a marker or crayon with which to create a "bumper sticker" he or she would enjoy wearing or displaying.
2. When the bumper stickers are finished, plan a sharing session. Students should be good listeners. After all have shared, they may ask questions, express mutual feelings and concerns.

Discussion of Activity

RL..What did you like about this activity?
CS..What are some reasons this was a good activity?
CF..What things worked well?
CS..What are some reasons things worked well for your group?
RL..What did you find out that you didn't know before?
EF..What are some reasons we should do more activities like this one?
AN..What are some ways we could change this activity to make it better? How would that change make it better?
SM..How was this activity like other you have done? How was it different?
..Other

Discussion of Process

RL..What things helped your group work well? Why did that help your group?
RL..What did you like about the way your group worked?
FL..What were some of the feelings that you had during this activity?
CS..What are some of the reasons you felt that way?
CO..What (positive) things will we want to remember the next time we have group work?
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..Other

Validation of Others

Suggest that members validate, saying:
"I liked it when..."
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Other

SKILLS BEING DEVELOPED

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SELF STATUES

SUBJECT AREA

Drama, All

OBJECTIVES

Students will be able to objectively look at their own image and portray it by molding their partner into that image.

DESCRIPTION

Students mold partners into statues of their own self-image.

ACTIVITIES

1. Divide class into pairs.
2. Ask for one student from each pair to mold their partner into a representation of themself. They must consider how they look to others and try to capture it in their statue's expressions, body attitude and position.
3. After finished students should stand with their backs to group until everyone is finished.
4. After all are finished class should circulate around statues trying to guess the identity of each statue by whispering in statue's ear until statue responds affirmatively.
5. Partners discuss and then reverse process.

VARIATIONS

Students could mold self-image in clay.

SKILLS BEING DEVELOPED

Risk-taking.

CONTRIBUTED BY

Victor Wilson through Workshop for Center for Theater Techniques in Education, 1850 Elm Street, Stratford, Connecticut 06497.

IMAGING

SUBJECT AREA

All

OBJECTIVES

Students will be able to picture images described by teacher and others in group.

DESCRIPTION

Jack Canfield, author of 101 Ways to Enhance Self-Image in the Classroom, believes we should do "imaging" exercises with students in order to expand the possibilities they can imagine within a given situation, thus, enhancing creativity.

ACTIVITIES

1. Break into small groups of 5-6.
2. Have all students close their eyes and try to picture in their mind the images you describe:

   "Imagine you are walking alone through a deep, thick, dark green jungle. The jungle is filled with low, sluggish sounds of animals and birds. As you walk deeper into the jungle it gets darker and darker. You feel the wetness of the air and soon the drops of perspiration become rain. It starts slowly and increases until the rain is so heavy your shoulders and head sting.

   The ground is now covered with water. It looks like a lake as the rain stops. It is shiny and smooth.

   The water below your feet becomes concrete. The plants disappear one by one until all that is left is concrete. The sun comes out. You are blinded by the brightness of the sun and concrete. It is very hot.

   A person's head appears above the horizon. Then several. They are all around you, walking. A cloud appears above you and swirls into a tornado. The tornado descends and picks up the crowd and you.

   The tornado becomes a champagne glass. The others have disappeared. You are floating in a martini cherry. Music soothes you. You fall asleep.

3. Discuss how students felt during exercise.

4. Go around circle having each student create images.

VARIATIONS

This exercise could be conducted with students sketching or painting.

SKILLS BEING DEVELOPED

Flexibility, elaboration

CONTRIBUTED BY

Victor Wilson in workshop through Center for Theater Techniques in Education, 1850 Elm Street, Stratford, Connecticut 06497.

CUTTING THE CAKE

SUBJECT AREA

All

MATERIALS

A supply of assorted candies. The number of candies should be almost twice the number of persons in the group. Small, individually wrapped candies should be used.

OBJECTIVES

Students will be able to see themselves and others in problem-solving situations.

DESCRIPTION

Students study their nature by dividing candies among the group.

ACTIVITIES

Break up into groups of four, five, or six members each.

Again, try to form a group with new people whom you have not interacted with very much until now. Break away from any "security blanket partner" you may have in the group.

Each group is to be given exactly the following number of assorted candies:

If the group has four members:	6 pieces of candy.
If the group has five members:	8 pieces of candy.
If the group has six members:	9 pieces of candy.

Each group is to distribute the candy among its members.

After all the groups have finished the taks, reassemble as one large group for discussion.

Discussion:

Since the number of candies could not be evenly divided by the number of persons in the group, how did your group decide to distribute the candies?

How did your group solve the problem? By coming up with a rational plan? By aggressions, letting the strongest take the spoils? By passivity, waiting for one member to solve the problem for everybody else?

Are you 100% satisfied with the way your group solved the problem?

Did one person tend to take over your group and make the decisions for the group? Was there a power struggle for leadership of the group? How did the group finally arrive at a settlement?

Did the members of the group try to distribute the candies according to what kind each member preferred?

Was there an effort to give each person in the group an exactly equal amount of candy?

Did some members of the group take the self-sacrificing approach?

Did some members of the group try to solve the problem by eliminating themsleves? (For example: "I don't like candy that much anyway.")

Was it difficult to get some members of the group to take more of the candy than the others?

Were you concerned about some other individual getting a certain amount of the candy?

Did you find it difficult to accept? Are you more comfortable giving than receiving?

If you are uncomfortable taking something for yourself, does this make it difficult for other people to show their affection for you?

Are you too dominating in a problem-solving situation?

Are you too passive in a problem-solving situation?

SKILLS BEING DEVELOPED

Receiving, Responding, Valuing

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GETTING TO KNOW ME

SUBJECT AREA

All

OBJECTIVES

Students will be able to receive what others think of them and contrast to self-evaluation.

DESCRIPTION

Two students talk for five minutes about a third person in the group while he listens on. Discussion follows.

ACTIVITIES

The activity outlined below will take about 20 minutes. Read the directions to yourself and do as indicated. There are some discussion questions for afterwards.

Form groups of 3 people each. Do not impose any system on how the groups are formed.

The groups should spread out as much as possible in the space available.

Two persons at a time will have a conversation about the third person--no other topic.

There will be a total of 3 conversations, one about each person.

The person who is being talked about should turn his back to the other two while they are talking about him. But he should remain close enough to listen to the conversation.

Each conversation should last exactly 5 minutes.

If there are one or two persons left over from the groups of three, one or two groups may expand into groups of four to accommodate them. When there are four persons in a group, the directions are the same except that the conversation about each member should last exactly 4 minutes.

For the discussion all the little groups should reunite into one large group.

How did you pick the persons you formed a group with? Did you just go with the persons nearest to you?

What was said about you?

Do you feel that the persons who talked about you have any real insight into you?

What are your feelings about what was said?

What are your feelings about each of the persons who spoke about you?

How do you feel when talking about someone else?

Were you very conscious of the person listening to you? What effects did this have on your conversation?

Were your conversations mostly about what the person does or about what the person is?

VARIATIONS

One person can talk about himself to the other two for five minutes - more revealing about self image.

One person can describe himself to another and have them act out being those qualities with others in the group.

SKILLS BEING DEVELOPED

Receiving, Responding, Valuing

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PEOPLE IN SPACE

SUBJECT AREA

All

OBJECTIVES

Students will be able to evaluate inter-personal relationships and represent them physically.

DESCRIPTION

Students physically represent their relationship to each of the group by where and how they place themselves in relation to them. Discussion follows.

ACTIVITIES

The following experience requires that only one member of the group at a time take the central role. Hence, if the group is large, more than one meeting may be required for this experience. Certainly not more than half of the available time for the meeting should be used for the experience. At least half the time should be used to discuss it.

Allow as many members of the group as possible to take the central role for the first half of the meeting, leaving at least half the time for the discussion. The other members of the group may take the central role at the next meeting.

Do not impose any order on who beings or who follows. Let each take a turn at the central role when he wishes.

> A member of the group will volunteer to stand still in the middle of the room. Then the other members of the group will each take some position in the room (or out of the room) that expresses their relationships with the person in the center of the room.
>
> When a person volunteers to stand in the center of the room, you may go to any spot in the room (or you may leave the room), face any direction, set yourself at any height, use the furniture in any way you want, etc., to express the relationship between yourself and the person in the center.
>
> Your position in relation to the person in the center should somehow express your feelings about how you relate to him and how he relates to you.
>
> The person standing in the center should take a few seconds to see where everybody else is in relation to him before the group dissolves and another person takes the center.

Remember to leave half the time of this meeting for discussion. Those who do not have a chance now can place themselves in the center at the next meeting.

Discussion:

What positions did you take relative to the persons in the center?

How did the positions you took in relation to others compare to the positions they took around you? Did others get closer to you than you did to them?

Do you wish to explain the positions you took? If so, explain your positions to the persons who were at the center.

Did you feel comfortable or uncomfortable in the positions you took?

Would you like to change the position you took relative to anyone? If so, tell him, and even take that new position now if you want.

If you were at the center, how did you feel at the center?

Is there anyone you would like to ask about the position he took relative to you?

Were you particularly concerned to see what positions certain individuals took relative to yourself?

Is there someone you wish had taken a different position? If so, tell that person.

Would you like to re-arrange all the group members around you? If you would, ask the group to let you make the arrangement you would like.

Was there a pattern to the positions you took?

Did the positions you took reflect the closeness or remoteness of your relationships to other people in general?

VARIATIONS

Could be done with drawing. Could be used in improvisation with characters.

SKILLS BEING DEVELOPED

Receiving, Responding, Valuing

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THE HAVES AND THE HAVE-NOTS

SUBJECT AREA

All

OBJECTIVES

Students will explore trust and giving within their groups.

DESCRIPTION

The group will explore trust.

ACTIVITIES

There are going to be three parts to this experience. When the directions say to stop for discussion, do so. Do not look ahead at what will be coming next or you will spoil it.

FIRST: Take all the change out of your pockets. (Only the coins.) If you have any quarters, put them back into your pocket. If you have no dimes, nickels, or pennies, there is nothing more for you to do right now. Just wait.

If you have any dimes, nickels, or pennies, give all of them to the person on your right.

If you receive coins, leave them in front of you so the group can see what has been given to you.

Stop. Do not read ahead until you have followed the directions given above. After you have done as directed above, go on.

No one may have his coins back. Not under any circumstances. If you received coins from the person next to you, they are now yours. You are not to give them back.

Pause now for a few minutes of discussion.

What are your feelings right now? Are you happy, sad, indignant, elated, angry?

How do you like the idea of being told that you must give your coins to the person on your right? What has your relationship been with this person until now?

Allow a few minutes for discussion--enough time for everyone who wishes to speak. Then go on. Do not read ahead until this discussion is finished.

SECOND: One at a time, each person in the group may request money from three other persons. (But not from the person he first gave his coins to.)

You may ask for money from any three persons, except the one you gave your coins to. It may be any amount up to the full amount the person has in front of him when you ask. The persons asked for money must hand over the amount asked for.

Do not hold any money in your hand. Keep all the coins out in the open in front of you where everybody can see them, including any new money you get from others.

Anyone may begin. Each person has the right to ask for money from three others when he takes his turn. But no one may have another turn.

Did you take money? How much did you take? Was it the amount you first gave away? Did you adopt an "I'm going to get mine back" approach to the situation?

From whom did you take money? How did it feel taking money from these particular persons? Is there anyone from whom you did not want to take any money?

Was money taken from you? By whom? Are these the persons you would expect to take it from you? Who do you think would not take money from you?

Describe the behavior of the group during this last part of the experience.

If you have less now than you started out with, are you now trying to blot out your feelings by saying it is not much money anyway?

If you have more than you started out with, how do you feel about that? How do you feel about the way you got it?

Did a few coins unleash such behavior that people became insensitive to the feelings of others?

Allow enough discussion time for everyone who wants to say something about what happened, then go on to the third part.

THIRD: Take the coins in front of you and give away as much as you please to any other members of the group you choose. (But not to the person who first had to give you his coins.)

Again, leave all your coins in front of you where the group can see them.

Then continue the discussion.

Did you give money to anyone? To whom? Why to this person (or these persons) rather than to someone else?

What are your feelings in giving the money to someone?

Did you receive money? From whom? How does it feel?

If you did not get any money, how does it feel getting nothing?

Does the way you reacted to this whole situation reflect your approach to life in general? Do you generally give more than you receive? Do you take enough for yourself? Do you take all you can get? Do you give nothing? How agressive are you? Do others take much from you?

Do others give much to you?

SKILLS BEING DEVELOPED

Receiving, Responding, Valuing

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KNOW YOURSELF

SUBJECT AREA

Language Arts, All

OBJECTIVES

Students will become more aware of their own personality factors through the following experiences.

DESCRIPTION

These activities are designed to help students know themselves better.

ACTIVITIES

1. Values clarification activities (examples)
   -Personal crest: on a crest outline, draw symbols of the things that are important to you. You may want to categorize the symbols into individual priorities, social priorities and family priorities. Discuss the crest with your peers.

   -Rate a Recreation: Quickly list your 20 favorite activities (spare time). Look over the list and put a $ by each activity that costs over five dollars, an "A" by each thing you do alone and an "O" by each thing you allow yourself to do at least once a week. Analyze your list; do you see any patterns, do you like the patterns you see, do you see a need to prepare a plan of change for your activities. You may want to discuss your list with peers and parents.

   -Needs Assessment: In a small group, decide which group member should get the dollar bill offered by the leader. The only rules are that the money cannot be divided equally among the group members, it cannot be given to charity and the decision must be agreed to by all members. When the decision has been made, ask these questions: What was your basis for selection? Would it have been the same if it had been $100? How did you feel during the the discussion? If any discussion focused on you, did your feelings change at that point? What group processes did you observe? (other ideas in Values Clarification, Maury)

2. Sentence Completion
   -The most imporant thing I'll ever do is...
   -If I could change the world...
   -My school experiences would be better if...
   -I have an obligation to...
   -Children need to have an opportunity to...
   -If I was totally selfish, I would...
   -In ten years, I will be...
   What do your words tell you about yourself? You may want to save your work to look at again in five years, or ten years, or...

3. Communicate with others (examples)
-Trust Walk: Pair off and blindfold one partner. Without any verbal communication lead the blinded partner around the building. Give them as many experiences as possible (touching, smelling, hearing). Trade positions. Discuss your reactions-did you trust him/her?

-Magic Circle: Everyone sits in a circle. One person is designated as the leader. S/he asks group members questions. The members answer as quickly as possible, saying "pass" if they choose not to answer. There should be no pressure to answer every question. Any group member can ask a question if they like. There is to be no immediate evaluation of anyone's answer. Questions can range from non-threatening ones like, "My favorite movie is..." to very personal ones like, "If I could be an animal..." or "I am most afraid when..." (Before starting, a statement should be made to the effect that the answers given are to be kept in the group and not discussed with others.) After the questions have been asked, analyze the session--What answers surprised you/enlightened you/bothered you? Discuss as a group.

-Body Passing: The group sits on the floor in a circle, as close together as possible. One person stands in the middle, crosses arms across his/her chest, stiffens legs and falls back into the group. The object is to support the person and pass him/her around the circle quickly. The group must cooperate, but the person must also trust the group members. After everyone has had a chance to be passed if s/he wishes, discuss feelings--was there trust? Were some trusted more than others?

-Assertiveness: Fogging-In a situation where someone has a demand or criticism continual agreement with them will allow you to control the discussion. Agree with their right to feel the way they do, but not with the feeling. Broken Record-you must have more "no" in you than the other person who is trying to coerce you into something you don't want. If you continually repeat your demands, they will eventually give up. (more ideas in I Feel Guilty When I Say No and Don't Say Yes When you Mean NO)

-Who is That?: On students backs fasten a sign with the name of a kind of person (lawyer, scientist, President, bartender, prostitute, teacher, gossip); the students move around the room conversing or reacting to each person based on the sign on his/her back. After a period of interaction, question the group about their feelings regarding the treatment they received. Then focus on the attitudes expressed toward the other people. What information does that give them about their values and judgment of people?

-Other resources can be found in TA materials, Body language and active listening materials, and those written by Glasser for teachers and parents (T.E.T., P.E.T., TA for Tots, TA for Kids)

SKILLS BEING DEVELOPED

Curiosity, risk-taking, complexity, imagination.

CONTRIBUTED BY

Carol Hadfield, 1724 North 14th, Beatrice, Nebraska 68310.

HERE'S HOW YOU DO IT...

SUBJECT AREA

All

OBJECTIVE

Students will be able to exercise their own creativity while reporting knowledge they have accumulated.

DESCRIPTION

Are your students tired of writing reports to prove or demonstrate their knowledge? Below is a list of ways they could report knowledge in their own creative ways!

ACTIVITIES

Students can choose one of the following ways to report information or compile a booklet using several different ways.

- map
- graph
- letter
- picture
- transparency
- 3-D object
- tape
- drawing
- painting
- telegram
- puzzle
- game
- diagram
- paragraph
- newspaper
- magazine
- ad
- film
- symbolic drawing
- problem
- analysis
- list
- weaving
- survey
- test
- autobiography
- banner
- booklet
- report
- activity calendar
- characterization
- chart
- cartoon
- chart story
- collection
- comparison
- construction
- crossword
- design
- dialogue
- dictionary
- diarama
- display
- dramatization
- experiment
- interview
- mask
- mobile
- mosaic
- mural
- observation
- outline
- paper mache'
- pattern
- play
- poster
- puppet
- questions
- scrapbook
- scroll
- sculpture
- sequence story
- skit
- song
- speech
- story
- time line

SKILLS BEING DEVELOPED

Application, synthesis, evaluation.

CONTRIBUTED BY

Source unknown.

EXTENDED NAMETAGS

SUBJECT AREA

All

MATERIALS

Paper or cards for names tags, pins, clock, pens or pencils.

OBJECTIVES

1. Promote inclusion.
2. Share personal values, history, interests, beliefs.
3. Enhance communications skills.

DESCRIPTION

The students make extended name tages as an introduction or "boundary breaker" activity.

ACTIVITIES

Pre-planning

1. Give an overview of today's activity. State expectation clearly.
2. Plan for helpers to distribute materials.
3. Plan precise directions for activity.

Instructions

1. Distribute materials.
2. Ask each child to print first name or nickname in center of card, then...
    - A. In upper left corner of card, write...
        1. The place where you spent a very happy summer.
        2. A place that is a very favorite of yours.
        3. A place you would like to return to.
    - B. In lower left corner of card, write...
        1. The name of a person who has it all together.
        2. The name of a person who has taught you something important.
        3. The name of a friend.
    - C. In the lower right corner, write...
        1. The time you remember spending three delicious hours in a row.
        2. The time Thanksgiving was most significant for you.
        3. An important thing that happened this year.
    - D. In the upper right corner, write three things you are good at.
    - E. Under your name, write the quality you most value in people.
3. Ask each child to form a triad with two others, all three having the same or similar qualities written under their names.

4. Explain that each person in triad will have one minute to talk about one corner of the card, and that each will talk about the same corner.
5. Ask triads to decide on a corner. Then begin. Set the timer to keep people on schedule.
6. Give triads two minutes to validate one another.
    A. "I liked it when..."
    B. "You're a lot like me when..."
7. Form new triads and repeat 5 and 6.
8. After two or three triad changes, ask all to form a large circle. Give opportunity for people to share something they learned.

Discussion of Activity

RL..What did you like about this activity?
CS..What are some reasons this was a good activity?
CF..What things worked well?
CS..What are some reasons things worked well for your group?
RL..What did you find out that you didn't know before?
EF..What are some reasons we should do more activities like this one?
AN..What are some ways we could change this activity to make it better? How would that change make it better?
SM..How was this activity like others you have done? How was it different?
..Other

Discussion of Process

RL..What things helped your group work well? Why did that help your group?
RL..What did you like about the way your group worked?
FL..What were some of the feelings that you had during this activity?
CS..What are some of the reasons you felt that way?
CO..What (positive) things will we want to remember the next time we have group work?
EF..What do you think might be the purpose/effects of an activity like this?
SM..What feelings did you have today during this activity that were like some you have had before?
..Other

Validation of Others

Suggest that members validate, saying:
"I liked it when..."
"It was helpful when..."
"I felt included when..."
"One neat thing about our group was..."
"Thanks...for..."
"It was very imporant to me when..."
Other

SKILLS BEING DEVELOPED

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CO--Concluding
QS--Questioning
AN--Anticipating
MC--Making Choices

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VARIATIONS OF A SPIDER WEB

SUBJECT AREA

All

MATERIALS

2 large string balls, Book: A Big Ball of String, Marion Holland, Ball of yarn or string for each group.

OBJECTIVES

1. Build group inclusion.
2. Practice active listening.
3. Get acquainted with each other.

DESCRIPTION

Another "warm-up" activity which can break creative and social boundaries for an unfamiliar group.

ACTIVITIES

Instructions

1. Sit in two circles.
2. Roll ball of yarn to one group member and use one of the following variations.
   A. Say own name and name an animal you would like to be and tell why, then roll the ball to someone else.
   B. Say your name and name your favorite food.
   C. Name your favorite thing to do.

Discussion of Activity

RL..What did you like about this activity?
CS..What are some reasons this was a good activity?
CF..What things worked well?
CS..What are some reasons things worked well for your group?
RL..What did you find out that you didn't know before?
EF..What are some reasons we should do more activities like this one?
AN..What are some ways we could change this activity to make it better? How would that change make it better?
SM..How was this activity like others you have done? How was it different?
..Other

Discussion of Process

RL..What things helped your group work well? Why did that help your group?
RL..What did you like about the way your group worked?
FL..What were some of the feelings that you had during this activity?

CS..What are some of the reasons you felt that way?
CO..What (positive) things will we want to remember the next time we have group work?
EF..What do you think might be the purpose/effects of an activity like this?
SM..What feelings did you have today during this activity that were like some you have had before?
..Other

Validation of Others

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"I liked it when..."
"It was helpful when..."
"I felt included when..."
"One neat thing about our group was"
"Thanks...for..."
"It was very important to me when..."
Other

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CAMPAIGN MANAGER

SUBJECT AREA

All

MATERIALS

All students names on round circles, or supply circles and have students print their own name and design their own campaign button, sack.

OBJECTIVES

1. To build inclusion.
2. To foster positive feelings among total class.
3. To build self-esteem.

DESCRIPTION

It is often necessary to have "boundary breaker" activities to put students in a creative or uninhibited state of mind. This one concentrates on positive interaction between students.

ACTIVITIES

Pre-planning

1. Give an overview of today's activity. State expectation clearly.
2. Model this activity for the class so they understand about being a campaign manager. It might be helpful to have full group discussion about campaigning and managers.

Instructions

1. Students meet in groups. Instruct each member of group to write his/her name on slip of paper and drop it into a bag.
2. Have each student draw a name out of the bag. Inform each student that he/she is the "campaign manager" for the person whose name has been drawn. The person has been nominated for:
   - A. Best skater of the day.
   - B. Outstanding person of the day.
   - C. Most likely to succeed.
   - D. Most humorous person.
3. Tell each participant to design a campaign button using circle of paper provided and list three good campaign statements promoting the nominee whose name they drew.
4. Have each campaign manager deliver his/her campaign speech and present his/her nominee with the campaign button.

Discussion of Activity

RL..What did you like about this activity?
CS..What are some reasons this was a good activity?
CF..What things worked well?
CS..What are some reasons things worked well for your group?
RL..What did you find out that you didn't know before?
EF..What are some reasons we should do more activities like this one?
AN..What are some ways we could change this activity to make it better? How would that change make it better?
SM..How was this activity like others you have done? How was it different?
..Other

Discussion of Process

RL..What things helped your group work well? Why did that help your group?
RL..What did you like about the way your group worked?
FL..What were some of the feelings that you had during this activity?
CS..What are some of the reasons you felt that way?
CO..What (positive) things will we want to remember the next time we have group work?
EF..What do you think might be the purpose/effects of an activity like this?
SM..What feelings did you have today during this activity that were like some you have had before?
..Other

Validation of Others

Suggest that members validate, saying:
"I liked it when..."
"It was helpful when..."
"I felt included when..."
"One neat thing about our group was..."
"Thanks...for..."
"It was very important to me when..."
Other

SKILLS BEING DEVELOPED

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COOPERATION SQUARES

SUBJECT AREA

All

MATERIALS

Puzzles for all the groups.

OBJECTIVES

1. To encourage cooperation.
2. To sensitize participants to their own behaviors which may help or hinder group effort.
3. To build inclusion and influence.

DESCRIPTION

Students must solve a problem without speaking. This develops non-verbal communication.

ACTIVITIES

Pre-planning

1. Give an overview of today's activity. State clearly your expectation.
2. Plan how you will handle your discussion about cooperation.
3. Have puzzles prepared for the groups you have.
4. Plan how to select observers and what they are to do. You might decide not to have observers.

Instructions

1. Begin exercise as full group discussion of meaning of cooperation. List on chalkboard the requirements for cooperation as generated by full group.
   Example: A. Everyone has to understand the problem.
   B. Everyone needs to believe that he can help.
2. Ask participants to meet in groups. Describe the activity as a puzzle that only can be solved with cooperation.
3. Hand out one puzzle set to each group.
4. Read the following instructions aloud:
   "Each group should have an envelope containing pieces for forming squares. The task of the group is to form five squares of equal size. Each square contains three puzzle pieces. The exercise is completed when each of the five members has formed a perfect square. No member may speak. No member may signal for a puzzle piece. Members may give parts to others.
5. Ask each group to distribute puzzle pieces equally among five members.
6. If you decide to use observers, the remaining member(s) are designated "Process Observers" who remain silent during the activity and share their observations after completion of task.

Discussion of Activity

RL..What did you like about this activity?
CS..What are some reasons this was a good activity?
CF..What things worked well?
CS..What are some reasons things worked well for your group?
RL..What did you find out that you didn't know before?
EF..What are some reasons we should do more activities like this one?
AN..What are some ways we could change this activity to make it better? How would that change make it better?
SM..How was this activity like others you have done? How was it different?
..Other

Discussion of Process

RL..What things helped your group work well? Why did that help your group?
RL..What did you like about the way your group worked?
FL..What were some of the feelings that you had during this activity?
CS..What are some of the reasons you felt that way?
CO..What (positive) things will we want to remember the next time we have group work?
EF..What do you think might be the purpose/effects of an activity like this?
SM..What feelings did you have today during this activity that were like some you have had before?
..Other

Validation of Others

Suggest that members validate, saying:
"I liked it when..."
"It was helpful when..."
"I felt included when..."
"One neat thing about our group was..."
"Thanks...for..."
"It was very important to me when..."
Other

SKILLS BEING DEVELOPED

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JOY

SUBJECT AREA

All

OBJECTIVES

1. To give each person opportunity to share a part of himself with others.

2. To increase communication skills.

3. To build inclusion and influence.

DESCRIPTION

Students share part of themselves and discuss feelings. A get-acquainted boundary breaker.

ACTIVITIES

Pre-planning

1. Give an overview of what will be happening today and the expectation you have for the group.
2. Prepare a chart or write on the board the explanation of JOY.

Instructions

1. Ask each person in the group to share three things about him/herself.
   a. J-something in your life that just happened.
   b. O-one thing you ought to do.
   c. Y-a part of you that makes you a special person.
2. Urge the listeners to give full, undivided attention to the speaker.
3. Plan a "sharing out" of the people who would like to share with the full group.

Discussion of Activity

RL..What did you like about this activity?
CS..What are some reasons this was a good activity?
CF..What things worked well?
CS..What are some reasons things worked well for your group?
RL..What did you find out that you didn't know before?
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SM..How was this activity like others you have done? How was it different?
..Other

Discussion of Process

RL..What things helped your group work well? Why did that help your group?
RL..What did you like about the way your group worked?
FL..What were some of the feelings that you had during this activity?
CS..What are some of the reasons you felt that way?
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SLIP GAME

SUBJECT AREA

All

MATERIALS

Paper bags, slips with questions on them.

OBJECTIVES

To promote personal sharing in a group.

DESCRIPTION

Each student selects a question from a bag, then goes around the circle and answers it.

ACTIVITIES

Pre-planning

1. Give an overview of today's activity. State expectation clearly.
2. Decide how you will group students.
3. Work on ideas for slips in the sack. Students might be able to add some but be cautious.

Instructions

1. Students sit in a circle.
2. A paper bag filled with question slips is passed around. Each has one question. There should be one slip for each student, plus a few extra. Each person draws one with eyes closed.
3. Those who would like a different question may select from those that remain in the bag. They must put the original slip back after doing so.
4. Go around the circle, each student reads his/her question, then answers it. They do have the right to pass.
5. Examples of questions:
   A. When was the last time you really dressed up?
   B. Why is wearing seat belts a good idea?
   C. How should students be taught spelling?
   D. How can we keep track of our P.E. equipment?
   E. What are some ways we can help make the lunchroom a pleasant place?
   F. How do you like to spend your money?
   G. Is receiving cards from people important to you?
   H. What program on TV do you watch the most frequently?
   I. What do you think of ETV?

Discussion of Activity

RL..What did you like about this activity?
CS..What are some reasons this was a good activity?
CF..What things worked well?
CS..What are some reasons things worked well for your group?
RL..What did you find out that you didn't know before?
EF..What are some reasons we should do more activities like this one?
AN..What are some ways we could change this activity to make it better? How would that change make it better?
SM..How was this activity like others you have done? How was it different?
..Other

Discussion of Process

RL..What things helped your group work well? Why did that help your group?
RL..What did you like about the way your group worked?
FL..What were some of the feelings that you had during this activity?
CS..What are some of the reasons you felt that way?
CO..What (positive) things will we want to remember the next time we have group work?
EF..What do you think might be the purpose/effects of an activity like this?
SM..What feelings did you have today during this activity that were like some you have had before?
..Other

Validation of Others

Suggest that members validate, saying:
"I liked it when..."
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PUBLIC INTERVIEW

SUBJECT AREA

All

OBJECTIVES

1. To build inclusion and influence.
2. To enhance communications skills.
3. To share personal values, beliefs, feelings and interests.

DESCRIPTION

A student sits in the middle of the circle and answers three questions then changes places with someone else.

ACTIVITIES

Pre-planning

1. Give an overview of today's activity. State expectation clearly.
2. Plan to model this activity for the group before you have students do it. Give precise directions.
3. Plan some questions if students have trouble coming up with some.

Instructions

1. Ask for a volunteer to sit in the circle to be interviewed.
    - A. Students in the outside cirlce think of a question they want the student in the center of the circle to answer.
    - B. The student in the center of the circle chooses the person who has a question to ask. The student in the center does not have to answer the question if he chooses to pass.
    - C. When the student in the center has answered three questions, ask for another volunteer and repeat the process.
2. Make sure students understand about the kinds of questions they should ask. They might be as follows: Autobiographical, Curriculum subjects, Politics, Leisure.

Discussion of Activity

RL..What did you like about this activity?
CS..What are some reasons this was a good activity?
CF..What things worked well?
CS..What are some reasons things worked well for your group?
RL..What did you find out that you didn't know before?
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Discussion of Process

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"AM I NAPOLEON"

SUBJECT AREA

All

MATERIALS

Names of famous people printed on index cards or paper with pencil or marker.

OBJECTIVES

To build full-group inclusion.

DESCRIPTION

This is an excellent "boundary breaker" and develops questioning skills too!

ACTIVITIES

Pre-planning

1. Give an overview of today's activity. State expectation clearly.
2. Choose the names carefully that the students will be wearing.
3. Plan precise directions.

Instructions

1. Put up "no talking signs" or "silence" signs to impress upon the students that they should not talk until you give the signal. Then start pinning names of the people onto the backs of the students.
2. Now explain that the objective is to determine "Who I am" by asking other people questions. The only answer they can give is "yes" or "no." Students mill around asking only one question of each other person, until they have determined their "famous name."
3. You could use names of animals, plants, foods, etc. if you'd like.

Discussion of Activity

RL..What did you like about this activity?
CS..What are some reasons this was a good activity?
CF..What things worked well?
CS..What are some reasons things worked well for your group?
RL..What did you find out that you didn't know before?
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Discussion of Process

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FL..What were some of the feelings that you had during this activity?

CS..What are some of the reasons you felt that way?

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..Other

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Suggest that members validate, saying:

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"I felt included when..."
"One neat thing about our group was..."
"Thanks...for..."
"It was very important to me when..."
Other

SKILLS BEING DEVELOPED

OB--Observing
RL--Recalling
DF--Noting Differences
SM--Noting Similarities
OR--Ordering
GR--Grouping
LB--Concept Labeling
CF--Classifying
CS--Inferring Causes
EF--Inferring Effects
FL--Inferring Feelings
CO--Concluding
QS--Questioning
AN--Anticipating
MC--Making Choices

CONTRIBUTED BY

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THE GOOD LIFE

SUBJECT AREA

All

MATERIALS

Films: "The Good Life," "The Pursuit of Happiness," and "The Alienated Man."

OBJECTIVES

Students will examine and scrutinize materials that have been designed to evoke serious questioning into life's meaning.

DESCRIPTION

This type of activity at the beginning and end of a course can give it relevance and personal meaning for the students.

ACTIVITIES

1. View, discuss and write critiques of the following series:
    a) "The Pursuit of Happiness"
    b) "The Good Life"
    c) "The Alienated Man"
2. At the onset of the course, the students write an essay in which they discuss their view on "The Good Life." Near the end of the year another articulation is made on the subject, presenting an opportunity to compare the last statements with the earlier ones.

SKILLS BEING DEVELOPED

Receiving, responding, valuing, organizing, characterizing.

CONTRIBUTED BY

Odye O'Connor and Denise Seng, Edwin G. Foreman High School, 3235 N. Le Claire Avenue, Chicago, Illinois 60641.

THE NEW MODEL ME

SUBJECT AREA

All

OBJECTIVES

Various

DESCRIPTION

Below are a few example activities from "The New Model Me" program in Ohio. Most can be adapted to all subjects to help develop students' personal/social skills.

ACTIVITIES

Straw Tower:

This is an activity to help you identify some of your responses in a group task situation.

* Each group will build a tower at least five feet high, using plastic straws and scotch or masking tape.
* The groups will have 15 minutes to complete the task.
* Each tower will be judged on its creativity, originality, and overall beauty.

Hierarchy of Needs:

This is an activity to help you learn more about human needs.

For the next five minutes, think about all the different kinds of needs a person seeks to fulfill in his daily living. Write these words outside a triangle.

Thought Starter: "Love is the ability to respond to the needs of people before they ask for it." - Theobald.

A Letter to the Coach:

This is an activity to help you become more aware of how needs affect behavior.

Dear Coach Adams:

Remembering our discussion of your football men who are having trouble in English, I have decided to ask you, in turn, for help.

We feel that Paul Spindles, one of our most prominent scholars, has a chance for a Rhodes Scholarship, which would be a great thing for him and for our college. Paul has the academic record for this award, but we find that the aspirant is also required to have other excellences, and ideally should have a good record in athletics. Paul is weak physically. He tries hard, but he has trouble in athletics.

We propose that you give some special consideration to Paul as a varsity player, putting him, if possible, in the backfield of the football team. In this way, we can show a better college record to the committee deciding on the Rhodes Scholarships. We realize that Paul will be a problem on the field, but--as you have often said--cooperation between our department and yours is highly desirable, and we do expect Paul to try hard, of course. During his intervals of study we shall coach him as much as we can. His work in the English Club and on the debate team will force him to miss many practices, but we intend to see that he carries an old football around to bounce (or whatever one does with a football) during intervals in his work. We expect Paul to show entire good will in his work for you, and, though he will not be able to begin football practice until late in the season, he will finish the season with good attendance.

Sincerely yours,

Dr. Wilfong Pearson
Head, English Department

P.S. We are delaying a decision on your request made to thid department regarding a passing grade for your fullback, Butch Johnson, until we receive your favorable reply.

Consider the following questions about needs:

1. What do you think were the needs of each of the three people involved?
2. In what ways did these needs seem to affect each person's behavior?
3. What are some alternative ways in which the needs of each of the individuals might be satisfied?
4. What might be some of the short- and long-term effects of the various alternatives?

Identity Auction:

This is an activity to help you clarify some of your feelings and wants.

List five things you would like to do or be in the next few years. You may want to fly a plane, go skiing, go fishing, or be an engineer, or a dentist. Give the list to your teacher.

Tomorrow you will be given a list of everything the members of the class have said they want to do yr be. Look over the list carefully and select some things you would like to do or be. We will put these items up for auction, and each of you will have $2000 to spend. When your money runs out, you cannot bid any more.

At the end of the auction, make a list of everything you purchased. After studying the list of items, make up some "I learned" statements. Share your statements with the class.

SKILLS BEING DEVELOPED

Receiving, responding, valuing, organizing, characterizing.

CONTRIBUTED BY

Reprinted with permission from The New Model Me-High School Student Book prepared by the Lakewood City Public School System and The Educational Research Council of America as an ESEA Title III Project granted by the Ohio Department of Education.

SUBJECT AREA

Drama, All

OBJECTIVES

Students will be able to:

1. Articulate their positive and negative attributes to their partner.
2. Embody the qualities of their partner in motions, sounds.

DESCRIPTION

Students act out "good" and "bad" aspects of partner in class.

ACTIVITIES

1. Students should have movement and vocal warm-ups to break down inhibitions.
2. Divide class into pairs.
3. Have first person tell partner what they feel their best qualities and habits are.
4. Partners go into center of room and proceed to physically act out the qualities described by their partner as being their good qualities. They must use body movements and position, non-verbal sounds and reactions to others to exemplify these qualities. Nonsense syllables can be added.
5. Do the same activity with negative qualities and then do positive and negative for opposite partner.
6. Discuss:

   Which qualities were harder to express about yourself? Which were harder to act out? Why?

   Does this activity make you feel better or worse about yourself? Why?

   Did you notice any negative characteristics having a positive component too? Which?

VARIATIONS

Students could be asked to draw or paint one another's positive then negative qualities.

SKILLS BEING DEVELOPED

Valuing, conceptualizing

CONTRIBUTED BY

Victor Lewis in workshop through Center for Theater Techniques in Education, New Haven, Connecticut.

PROBLEM-SOLVING ACTIVITIES

1. POP-OFF. Place a dollar bill flat on a table, turn an empty pop bottle upside down so that it's mouth rests on the center of the bill. Without tipping over the bottle, and allowing nothing to touch the bottle other than the bill or the table, remove the dollar bill from beneath the bottle. (Allow 4 minutes). (Answer: Using the thumb and index finger of each hand, carefully roll up the dollar bill from one end, permitting the roll to push the bottle slowly off the bill.)

2. REVERSAL. A triangle of ten pennies points away from you. Moving only three pennies, make the triangle point toward you. (Allow 4 minutes). (Answer: Move 7 to left of 2; 10 to right of 3; then one below and between 8 and 9.)

3. RUNAROUND. Arrange ten matches so that they create the equation in roman numerals XI + I = X. This equations is, of course, incorrect. Make the equation read correctly without touching anything. (Allow 4 minutes). (Answer: Run around to the other side of the table and look.

4. The following puzzle, known as the Smith-Jones-Robinson classic, is a lively test of reasoning power. There is no "catch" in the puzzle, and the answer has been worked out by many persons in five to ten minutes. Every fact is important, and must be considered.

   On a train, Smith, Robinson and Jones are the fireman, brakeman and engineer, but NOT respectively. Also aboard the train are three businessmen who have the same names: a Mr. Smith, a Mr. Robinson and a Mr. Jones.

   A. Mr. Robinson lives in Detroit.
   B. The brakeman lives exactly halfway between Chicago and Detroit.
   C. Mr. Jones earns exactly $20,000 per year.
   D. The brakeman's nearest neighbor, one of the passengers, earns exactly three times as much as the brakeman.
   E. Smith beats the fireman at billiards.
   F. The passenger whose name is the same as the brakeman's lives in Chicago.

   Who is the engineer?

   (Answer: The brakeman, who lives halfway between Chicago and Detroit, also lives near Mr. _______, who earns three times as much as he does. Mr. ______ can't be Mr. Robinson, as Mr. Robinson lives in Detroit. He can't be Mr. Jones as Mr. Jones' $20,000 a year isn't divisible by three. Therefore the brakeman's neighbor must be Mr. Smith.

   The passenger whose name is the same as the brakeman's lives in Chicago. He can't be Mr. Robinson, as Mr. Robinson lives in

Detroit. He can't be Mr. Smith, as Mr. Smith is a neighbor of the brakeman, who lives halfway between Chicago and Detroit. Therefore he must be Mr. Jones.

Therefore, the brakeman's name is also Jones.
Smith beats the fireman at billiards, so the fireman must be Robinson. Therefore the engineer is Smith.

5. How much earth is there in a hole measuring one foot by one foot by one foot? (Answer: None, of course! It's a hole)

6. Would a marble fall faster through water at 60° F. or at 10°F.? (Answer: At 60°F. Try dropping a marble through ice. Water freezes at 32°F.)

7. Two fathers and two sons each shot a duck. None of them shot the same duck, but only three ducks were shot. Why? (Answer: An old man, his son and his grandson each shot a duck. The first two were both fathers, and the second and third were the two sons.)

8. A deep-sea fishing boat is lying in harbor. Over the side hangs a rope ladder, with its end just touching the water. The rungs of the ladder are one foot apart, and the tide is rising at the rate of eight inches an hour. At the end of six hours, how many of the rungs will be covered? (Answer: None. There is something very wrong with a boat if it does not rise with the tide.)

9. How is it possible for Jim to stand behind George and George to stand behind Jim--at the same time? (Answer: They stand back to back)

10. There are five apples in a basket and five people besides yourself in the room. How can you give an apple to each of the five people, and yet leave one apple in the basket? (Answer: You give one of them the basket as well as an apple.)

11. A farmer has five half-size haystacks in the corner of a field, and two three-quarter-size haystacks in another corner. If he puts them all together, how many haystacks will he have? (Answer: He put them all together, so of course he had one.)

12. If you were given the height and radius of a spool of thread, and the thickness of the thread on the spool, what would be the quickest way of finding out the length of the thread? (Answer: Look at the label. You will find the length printed there.)

13. All the other teachers ended their classes as soon as they heard the first stroke of twelve o'clock. Mr. Jones never let his children out until the school clock sounded the twelfth stroke. "It's a shame," groaned Peter. "Each stroke takes six seconds; so we do seventy-two seconds' more work than any of the others." "It's not as bad as all that," said Sally. "I counted the first six strokes today, and they only too thrity seconds. So we are only a minute late." How much longer did Mr. Jones' class work each day? (Answer: Both Peter and Sally were wrong. If there were six seconds between each stroke, their would be sixty-six seconds between the first stroke and the twelfth. And that is how much longer Mr. Jones' class had to work.)

14. What five-letter word sounds the same even when you take away four of its letters? (Answer: Queue.)

15. A notebook and a pencil cost a total of $1.20. The notebook costs $1 more than the pencil. What is the cost of each? (Answer: Notebook-$1.10, Pencil-10 cents.)

16. How far can a dog run into the woods? (Answer: Halfway. After that he's running out.)

17. What is the closest relation your mother's brother's brother-in-law could be to you? (Answer: Your father)

18. In a certain African village there live 800 women. Three percent of them are wearing one earring. Of the other 97 percent, half are wearing two earrings, half are wearing none. How many earrings all together are being worn by the women? (Answer: Among the 97 percent of the women, if half wear two earrings and half none, this is the same as if each wore one. Assuming, then, that each of the 800 women is wearing one earring, there are 800 earrings.)

19. A logician with some time to kill in a small town decided to get a haircut. The town had only two barbers, each with his own shop. The logician glanced into one shop, and saw that it was extremely untidy. The barber needed a shave, his clothes were unkept, his hair was badly cut. The other shop was extremely neat. The barber was freshly shaved and spotlessly dressed, his hair neatly trimmed. The logician returned to the first shop for his haircut. Why? (Answer: Each barber must have cut the other's hair. The logician picked the barber who had given his rival the better haircut.)

20. Smith gave a hotel clerk $15 for his room. When the clerk discovered that he had overcharged by $5, he sent a bellboy to Smith's room with five $1 bills. The dishonest bellboy gave three to Smith, keeping two for himself. Smith has now paid $12. The bellboy acquired $2. This accounts for $14. Where is the missing dollar? (Answer: Adding the bellboy's $2 to the $12 Smith paid for his room produces a meaningless sum. Smith is out $12, of which the clerk has $10 and the bellboy $2. Smith got back $3, which accounts for the full amount of $15.)

21. A secretary types four letters to four people and addresses the four envelopes. If she inserts the letters at random, each in a different envelope, what is the probability that exactly three letters will go into the right envelopes? (Answer: Zero. If three letters match the envelopes, so will the fourth.)

22. If you took three apples from a basket that held 13 apples, how many apples would you have? (Answer: Three apples)

23. If nine thousand nine hundred nine dollars is written as $9909, how should twelve thousand twelve hundred twelve dollars be written? (Answer: $13,212.)

24. A chemist discovered that a certain chemical reaction took 80 minutes when he wore a wool jacket. When he was not wearing the jacket, the same reaction always took an hour and 20 minutes. Explain? (Answer: Eighty minutes is the same as one hour and 20 minutes.)

25. A customer in a restaurant found a dead fly in his coffee. He sent the waiter back for a fresh cup. After a sip he shouted, "This is the same cup of coffee I had before!" How did he know? (Answer: The customer had sugared his coffee before he found the dead fly.)

26. "I guarantee," said the pet-shop salesman, "that this parrot will repeat every word it hears." A customer bought the parrot but found it would nit speak a singe word. Nevertheless, the salesman told the truth. Can you explain? (Answer: The parrot was deaf.)

27. Give at least two ways a barometer can be used to determine the height of a tall building. (Answer: Lower the barometer by a string from the roof to the street, pull it up, and measure the string. Or find the super and offer him the barometer if he will tell you the height.)

28. What five-letter word contains four personal pronouns, with the letters in the correct order? (Answer: Usher-us, she, he, her.)

29. Make a single common English word from these letters: pnlleeee-sssss. (Answer: Sleeplessness.)

30. Add one vowel to the letters wtthfl, then unscramble them and make a word. (Answer: E: twelfth.)

31. Fill in the blanks in the following sentence, using the same set of letters in the same order in each blank, and make a sensible sentence: A _____doctor was _____ to operate because he had _____. (Answer: A notable doctor was not able to operate because he had no table.)

32. Scramble the letters in the word "chesty" and make another English word. (Answer: Scythe)

33. What state has contributed the greatest number of Presidents? (Answer: Virginia has produced eight Presidents: Washington, Jefferson, Madison, Monroe, William Henry Harrison, Tyler, Taylor and Wilson.)

34. What state has contributed the second greates number? (Answer: Ohio: Grant, Hayes, Garfield, Benjamin Harrison, McKinley, Taft and Harding.)

35. What President never went to school? (Answer: Andrew Johnson. Lincoln's formal education totaled less than a year, but Johnson had no formal schooling whatsoever.)

36. Who was the only ex-President to be elected to the office again? (Answer: Grover Cleveland. First elected in 1884, defeated for re-election by Benjamin Harrison in 1888, and then defeated Harrison in the election of 1892.)

37. What four Presidents were assassinated? (Answer: Abraham Lincoln, 1865; James A. Garfield, 1881; William McKinley, 1901; and John F. Kennedy, 1963.)

38. What four others died in office? (Answer: William Henry Harrison, 1841; Zachary Taylor, 1850; Warren G. Harding, 1923; and Franklin D. Roosevelt, 1945.)

39. What President lived to see his son also become President? (Answer: John Adams, our second President, lived to see his son, John Quincy Adams, become the sixth.)

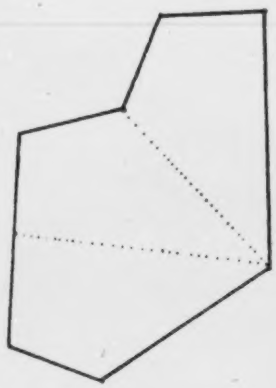
40. Who was the only President to be married in the White House? (Answer: Grover Cleveland was married in the White House to Miss Frances Folsom on June 2, 1886.)

41. STAR WARS: Imagine that you lived a long time ago in a galaxy far away. You have been assigned to trace the path of a secret message. You have the list of possible spies who can talk to each other. The arrows tell you which spies talk to each other. How will the Jawa get his secret message to the Grand Moff Tarkin?

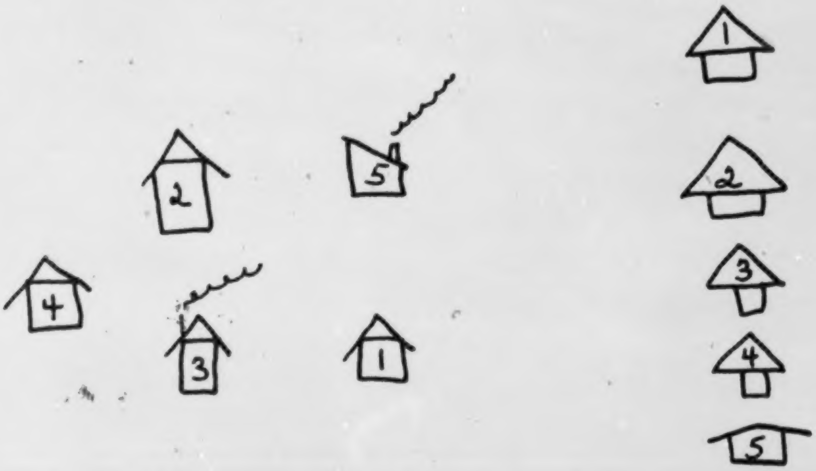
Jawa ↔ Luke Skywalker
Chewbacca ↔ Han Solo
Darth Vader ↔ Grand Moff Tarkin
Princess Leia ↔ Obi Wan Konobi
Han Solo ↔ Luke Skywalker
Stormtroopers ↔ C3PO
Tuskin Raiders ↔ Darth Vader
R2D2 ↔ Tuskin Raiders
Tuskin Raiders ↔ Chewbacca
Luke Skywalker ↔ Stormtroopers
Obi Wan Konobi ↔ Jawa

(Answer: Jawa - Luke Skywalker - Han Solo - Chewbacca - Tuskin Raiders - Darth Vader - Grand Moff Tarkin)

42. Can you divide this shape into three identical parts by drawing only two straight lines?



43. The people who live in the 5 houses are exceptionally unfriendly. They do not like each other at all. Each keeps his car in the garage with the same number as his house. They have figured out a way to go from their houses to their garages without crossing someone elses path. See if you can draw lines from the houses to the garages without crossing or going off the paper.



44. Who is the murderer?

Clues: When he was discovered dead, Mr. Kelley had a bullet hole in his thigh and a knife wound in his back.

Mr. Jones shot at an intruder in his apartment building at 12:00 midnight.

The elevator operator reported to police that he saw Mr. Kelley at 12:15 a.m.

The bullet had been fired from Mr. Jones' gun.

When the elevator man saw Mr. Kelley, Mr. Kelley was bleeding slightly, but he did not seem too badly hurt.

A knife found in Miss Smith's yard had Mr. Scott's fingerprints on it.

A knife with Mr. Kelley's blood on it was found in Miss Smith's yard.

Mr. Kelley had destroyed Mr. Jones' business by stealing all his customers.

The elevator man saw Mr. Kelley's wife go to Mr. Scott's apartment at 11:30 p.m.

The elevator operator said that Mr. Kelley's wife frequently left the building with Mr. Scott.

Mr. Kelley's body was found in the park.

Mr. Kelley's body was found at 1:30 a.m.

Mr. Kelley had been dead for one hour when his body was found, according to a medical expert working with the police.

The elevator man saw Mr. Kelley go to Mr. Scott's room at 12:25 a.m.

The elevator man went off duty at 12:30 a.m.

It was obvious from the condition of Mr. Kelley's body that it had been dragged a long distance.

Miss Smith saw Mr. Kelley go to Mr. Jones' apartment building at 11:55 p.m.

Mr. Kelley's wife disappeared after the murder.
Police were unable to locate Mr. Scott after the murder.
When police tried to locate Mr. Jones after the murder, they discovered that he had disappeared.
The elevator man said that Miss Smith was in the lobby of the apartment building when he went off duty.
Miss Smith often followed Mr. Kelley.
Mr. Jones had told Mr. Kelley that he was going to kill him.
Miss Smith said that nobody left the apartment building between 12:25 a.m. and 12:45 a.m.
Mr. Kelley's blood stains were found in Mr. Scott's car.
Mr. Kelley's blood stains were found on the carpet in the hall outside Mr. Jones' apartment.

(Answer: Mr. Scott)

45. Who Owns the Zebra?

A. There are five houses, each of a different color and inhabited by men of different nationalities, with different pets, drinks and cigarettes.
B. The Englishman lives in the red house.
C. The Spaniard owns the dog.
D. Coffee is drunk in the green house.
E. The Ukrainian drinks tea.
F. The green house is immediately to the right (your right) of the ivory house.
G. The Old Gold smoker owns snails.
H. Kools are smoked in the yellow house.
I. Milk is drunk in the middle house.
J. The Norwegian lives in the first house on the left.
K. The man who smokes Chesterfields lives in the house next to the man with the fox.
L. Kools are smoked in the house next to the house where the horse is kept.
M. The Lucky Strike smoker drinks orange juice.
N. The Japanese smokes Parliaments.
O. The Norwegian lives next to the blue house.

Now, who drinks water? And who owns the zebra? (Answer: The Norwegian drinks water. The Japanese owns the zebra)

46. Place three glasses in a row, with the middle one turned upside down. Pick up two at a time, one in each hand, and turn them over. Make three of these moves, but do not turn the same two glasses in consecutive moves, and end with all upside down. (Answer: Turn the second and third; then the first and third; then the second and third.)

47. Grasp the stem of a wineglass in the second, third and little finger, and hold two lumps of sugar (or small dominoes), one on top of the other, in thumb and forefinger. Now put both lumps of sugar into the glass, one after the other, without using your

other hand. (It's easy to toss the first lump and catch it in the glass, but when you toss the second you'll find that the first one is likely to fly out.) (Answer: Instead of tossing the second lump, simply let go of it and catch it by lowering the glass quickly.)

48. Lay a calling card on top of a wineglass and place a nickel on the card. Now blow the nickel into the glass. (Answer: Do not blow at the coin itself; blow into the mouth of the glass. The card's outer edge will tilt and the coin will slide into the glass.)

49. What do the distress-signal letters SOS stand for? (Answer: SOS stands for nothing -- merely a combination of letters easy to send and receive by wireless.)

50. For what crime was Captain Kidd hanged? (Answer: Captain Kidd was hanged for murder. He hit one of his seamen over the head with a bucket and killed him. The charge of piracy was never proved.)

51. To what musical form does the anthem "My Country, 'Tis of Thee" belong? a. Tango. b. Slow march c. Waltz. d. Fox Trot. (Answer: c. Waltz time)

52. During which of our four seasons is the sun nearest the earth? (Answer: The sun is nearest during our winter. But the rays then come down slantwise on the northern hemisphere, distributing their heat over much more surface.)

53. In World War I, who said to the French people, "Lafayette, we are here"? (Answer: Not said by General Pershing. It was part of a speech at Lafayette's tomb by the AEF's chief disbursing officer, Charles E. Stanton.

54. There should be one comma in the song title "God Rest Ye Merry Gentlemen." After which word should it be placed? (Answer: The comma goes after "Merry." "God rest ye merry" was a common greeting in early England.)

55. Which of the following substances does a plant depend on for almost 100 percent of its food? a. rock b. air c. soil d. bacteria. (Answer: A plant depends on the air for practically all its nourishment. It combines air with water by photosynthesis to manufacture its food. The soil provides only a trace of mineral foods.)

56. How were "witches" put to death in early Salem, Massachusetts? (Answer: Nineteen "witches" were hanged and one crushed with rocks. None was burned.)

57. Which phrase best describes the word "Xmas"? a. An irreverent, commercialized form. b. An ancient, reverent form. c. A space-saving form invented by headline writers. (Answer: "Xmas is a reverent form. "Chi" (X) is the first letter of Christ's name in Greek, and in the early church it was frequently used as a holy symbol.)

58. A man is going home and is stopped by a man in a mask. What is the occasion? (Answer: A baseball game)

59. A man living by the coast picks up the newspaper and upon reading it immediately shoots himself. Why? (Answer: The man lives in a lighthouse which went out during the night causing a shipwreck)

60. A dead man is lying face down with a pack on his back. How did he die? (Answer: His parachute failed to open)

61. A man is dead in a room with a table, four chairs and 53 Bicycles; how did he die? (Answer: "Bicycle" is a brand name for cards - of which there are 53. He was shot for cheating in a card game)

62. "There was blood in the middle of the "Knight." What happened? (Answer: He shot himself) This only works orally.

63. Tuts, Futs, and Huts:

After the Atomic War of 2084, only three tribes survived on Earth; the Tuts, who never lie; the Futs, who never tell the truth; and the Huts, who alternately tell the truth and lie.

The elders of the three tribes, recognizing that differences between peoples had almost led to human extinction, mandated a strict matrimonial code designed to erase hereditary differences between the three tribes. Provisions of this code require that no person marry a person of the same hair color; that no person marry a person of the same tribe; that no person take more than one mate; and that no person marry another person who is more than 10 years younger or older than himself or herself.

The Sunday after the code was established, four men and four women were married. The men were Tom, Dick, Harry and Ralph. One of them is 20, one 30, one 40, and one 50. The women were Sally, Mary, Ruth, and Helen. Each woman is a different age. Each is exactly the same age as one of the men.

Each of the men has a different hair color, either black, red, brown, or blonde. The same is true of the women.

Two of the men and two of the women are Tuts. One man and one woman are Futs. One man and one woman are Huts.

From statements below made by the men, determine the tribal origin of each of the eight persons, who is married to whom, the age of each, and the hair color of each.

Tom:
1. Harry is married to Sally.
2. Ralph is married to a Hut.
3. Ralph is 50.
4. The 50 year old female is a Fut.
5. I am 40.

Dick:
1. I am 30.
2. I am married to Helen.
3. I have blonde hair.
4. Harry is a Tut.
5. My 20 year old wife has black hair.

Harry:
1. I am married to a Tut.
2. Ralph has black hair.
3. I have brown hair.
4. I am 20.
5. My wife has red hair.

Ralph:
1. Tom has red hair.
2. Dick is a Fut.
3. I am married to Ruth.
4. Harry is not 40.
5. My wife has brown hair.

Answer:

	TRIBE	HAIR	SPOUSE	AGE
Tom	Tut	Red	Helen	40
Dick	Fut	Black	Mary	20
Harry	Hut	Brown	Sally	30
Ralph	Tut	Blond	Ruth	50
Sally	Tut	Red	Harry	20
Mary	Tut	Blond	Dick	30
Ruth	Hut	Brown	Ralph	50
Helen	Fut	Black	Tom	40

64. A variation of one of the common divergent thinking exercises is used as a warm-up to creative writing. In a limited amount of time, students brainstorm responses to questions like:
A. How could you open a pop bottle without an opener?
B. What sorts of things could you do with an inner tube?
C. How many ways could you travel to school.

PROBLEM SOLVING ACTIVITIES

From Science Teacher, October, 1977, p. 30-31
"Letting in the Lateral" by Alan J. McCormack

Imagine that you and your brother live in Los Angeles and that your rich Uncle Albert generously gives both of you identical racing cars. Suddenly Uncle Albert dies. You and your brother are summoned for a reading of the will, where the lawyer quotes this peculiar clause:

> "My entire estate of $3 million I bequeath to that brother whose care comes in last in a race to New York, which shall start immediately after the reading of this will. There shall be no agreement of any kind between brothers to share or divide the money."

Answer: (Drive your brother's car to New York as fast as possible.)

The sketches in Figure 1 show the front and side views of a solid object. Relax and think about the object. Then, take a pencil and draw its top view. Now see Figure 2.

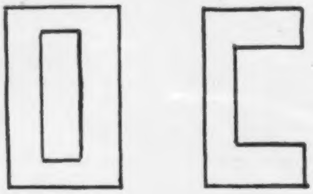


Figure 1

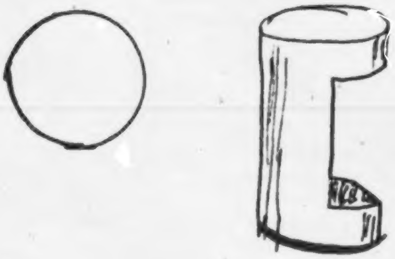


Figure 2

SUBJECT AREA

Science

DESCRIPTION

This activity is particularly useful when showing the students the scientists' frustration of dealing with unknown factors. The nature and arrangement within the atom for instance is analogous to the problem encountered in this activity. What is inside? What is its shape? What is its position relative to the rods in the box. Compare these questions with the charge, number of protons, weight of the atom, and relative position of the electron to the nucleus in the atoms make-up.

ACTIVITIES:

Students are grouped in small clusters of six or less. Each group is given a "black box." Students are instructed to use any method except opening the box to determine the arrangement of materials inside. Each group should draw on paper its version of the arrangement of material in the box. (The teacher must, of course, first wrap several boxes containing assorted items.)

SKILLS BEING DEVELOPED

Divergent thinking; problem solving, synthesis

CONTRIBUTED BY

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4. Each group draws 5 slips from the "think tank." They will use any or all of these to come up with appropriate inventions. Doing one together as a class will often help get them started.

Closure:

Discuss inventions and ask about possibly actually following through with some of these ideas. Ask how they can alter or use this method in other ways.

VARIATIONS

The "Hughes Quiet Wall" would follow as a logical activity - it is a solution to the second example invention.

Have students write stories involving their inventions after reading this story.

SKILLS BEING DEVELOPED

Fluency, flexibility, synthesis.

CONTRIBUTED BY

Idea for activity from Alan J. McCormack article entitled "Letting in the Lateral" Science Teacher, October, 1977, p. 30-33.

SUBJECT AREA INDEX

Below is a listing of activities which may relate to each of the subject areas. However, it is advised that an educator interested in one particular subject carefully examine all of the activities in the "Activities to Integrate" section of the catalogue in addition to his/her specific subject section.

SUBJECT	SECTION	ADDITIONAL PAGES
Language Arts	15-87	117-119, 151-152, 159, 162-164, 178-182, 185-186, 253, 270, 305-6 377-85, 392-3, 427-34.
Social Studies	100-191	15-16, 44-50, 73, 81-82, 304-6, 332-45, 356-8, 381-5, 392-3, 403-4, 411-12, 416-17, 429-34, 463-4, 502-5.
Mathematics	192-290	305-8, 313-17, 331, 344-7.
Science	290-376	117-19, 151-52, 185-86, 196-201, 210-11, 228-35, 363-65, 394-97, 413-16, 427-28, 526-27.
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Index of Activities

Using Specific Models

Below is an index of the activities which use a specific teaching model. (The models are outlined in the first section of this book.) Most are defined according to Bloom's Taxonomy (see page 3) so are listed first.

Activities using Bloom's Taxonomy

Subject	Pages
Language Arts	15-16, 17-18, 19-25, 26-28, 29-31, 32-35, 36-37, 38-39, 40-42, 43, 44-50, 56, 57-58, 74-75, 81-82, 85-87
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INDEX OF ACTIVITIES
by Models of Teaching*

Model Subject	Frank Williams' Thinking-Feeling	J.P. Guilford's Structure of Intellect	Krathwohl's Affective Hierarchy	Paul Torrance's Creativity	Dave's Psychomotor Hierarchy	Other (Described in activity)
Language Arts	38-39, 51-55, 59-61 78, 79	62-63,64 65-66,67-68, 78, 79, 80, 83-84	19-25			69-70, 76-77
Social Studies	187-191		100, 107-112, 147-150	113-116		145-146, 160-161, 170-171
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*See pages 1-14 for outlines of teaching models.

Subject / Model	Frank Williams' Thinking-Feeling	J.P.Guilford's Structure of Intellect	Krathwohl's Affective Hierarchy	Paul Torrance's Creativity	Dave's Psychomotor Hierarchy	Other (Described in activity)
Miscell-aneous		527-528		530-532, 534-535		

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